

1990 Short Form Designers' Guide

DATA CONVERTERS
AMPLIFIERS
ANALOG SIGNAL PROCESSING
TRANSDUCERS
VOLTAGE REFERENCES
SWITCHES AND MULTIPLEXERS
DATA ACQUISITION SUBSYSTEMS
DIGITAL SIGNAL PROCESSING



Featuring New Product Update

1990 SHORT FORM DESIGNERS' GUIDE

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1990 SHORT FORM DESIGNERS' GUIDE

This Designers' Guide serves as an update to the Selection Guides in the most recently released Databooks. It also provides the most current data on specifications and prices as well as the descriptions and block diagrams for many new products.

This Guide is intended to make it easy for users and potential users to become aware of, consider and compare products and product families available from Analog Devices as possible solutions to measurement and control, signal processing and system design problems. Once having arrived at preliminary choices, the user can look up complete information on the products in our Databooks, or else obtain data sheets on newer products by dropping a card in the mail or making a phone call to one of our sales offices (pages 69 and 70) or to our literature distribution center in Norwood, Massachusetts (617) 461-3392.

This book contains:

- Selection Guides and characteristics tables for comparing features and specifications for all products that are recommended for new designs;
- A comprehensive index to all products;
- New product descriptions, specifications and block diagrams;
- A list of products still in production but not listed in the primary tables because they are not recommended for new designs;

- A list of products no longer available;
- A list of products available to various military standards;
- A description of our Application Specific Integrated Circuit capability;
- Worldwide customer service directory.

PRODUCT DATABOOKS

Analog Devices has recently published a complete set of databooks which contain the data sheets and additional technical information on all of our current products. This Databook set is comprised of three volumes; Data Conversion Products, Linear Products and Digital Signal Processing Products. The products in these Databooks cover the entire range of data acquisition and signal processing requirements. If you have not already received a set of these Databooks, they can be obtained by contacting our main offices or one of our sales offices.

HOW TO USE THIS BOOK

This Volume

This volume is intended to lead the designer to the optimum component to fit a given application with the right mix of performance, features and cost, while also providing up-to-date information on new products. It is to be used in conjunction with our most recent Databooks and detailed data sheets, and provides source references for more detail.

If You Know the Product Number

Please turn to the product number index on page 71. This will lead you to the selection chart which contains that product and will allow you to compare it with other similar products. The selection chart will also tell you where more detailed data is available.

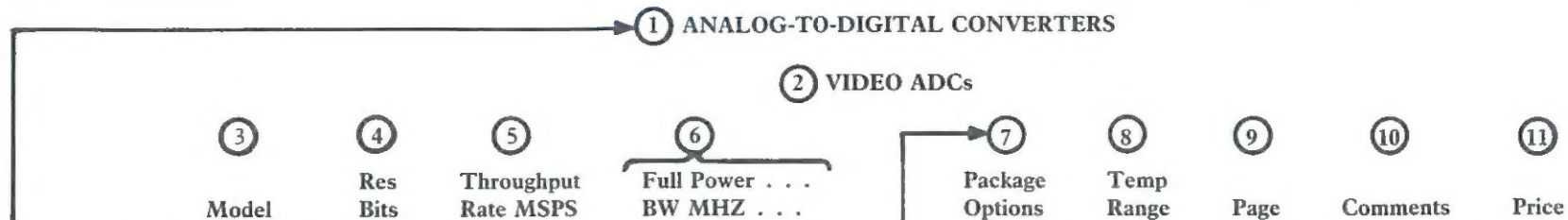
If You Don't Have a Product Number

If you have a product requirement, start with the table of contents; this will lead you to the proper selection charts of that product class. You can then quickly find a product with the needed mix of specifications.

If You Can't Find It Here . . . Ask!

This book contains all available products from Analog Devices through releases of 1989. If you have a product number which is not listed, or if you have a performance requirement which does not seem to be met in the Selection Guides, please call your nearest sales office or Analog Devices at (617) 461-3596. If you would like a data sheet on a specific product or our complete catalog, call (617) 329-4700, Extension 3392.

Selection Guide Organization (Example)



- 1 Major product area heading.
- 2 Secondary product area heading (a product may be found in more than one area).
- 3 Generic part number (without suffixes for performance grades or packages).
- 4 Primary specification (first sort criterion).
- 5 Secondary sort specification.
- 6 Other key specifications. All specifications are min or max unless noted as typical.
- 7 Package options — product available in these package styles. Package guide at the bottom of each odd page.
- 8 Temperature ranges available — C = Commercial 0 to +70°C; I = Industrial -40°C to +85°C; M = Military -55°C to +125°C.
- 9 Page — Letter designation indicates the appropriate product databook in which complete data sheet information can be found. D = *DSP Products Databook*, C = *Data Conversion Products Databook* and L = *Linear Products Databook*. If a letter designation is preceded by "P," this indicates a preliminary data sheet in the databook. More up-to-date information is now available. SF = new product since databook publication. Block diagram and key features provided in the New Products section of this guide. Detailed data sheet available. N = design-in products not contained in databooks, but data sheets are available. Contact your nearest sales office for data sheets on any of the above.
- 10 Additional comments on features or applications.
- 11 Price — U.S. price in dollars for lowest grade and package in quantities of 100.

Note that products are listed by generic part number only, such as AD9002, without additional suffixes for performance grade and package style (e.g.,

AD9002AD). In cases where product grades have differing values for a given specification, the range for all grades is given. The individual product data sheets provide the detail specifications on the actual models available, as well as complete ordering information.

PACKAGE OPTIONS

- D Side-Brazed Dual-In-Line Ceramic
- E Leadless Chip Carrier
- F Flat-Pack
- G Pin Grid Array
- H Round Hermetic Metal Can (Header)
- M Metal Hermetic Dual-In-Line
- N Plastic Molded Dual-In-Line
- P Plastic Leaded Chip Carrier (PLCC)
- Q Cerdip
- R Small Outline Plastic (SOIC)
- V Pin-Stake
- W Ceramic/Glass Dual-In-Line, Non-Hermetic
- Y Single-In-Line
- Z Ceramic Leaded Chip Carrier

TEMPERATURE RANGES

- C Commercial — 0 to +70°C
- I Industrial — -40°C to +85°C
(Some Older Products -25°C to +85°C)
- M Military — -55°C to +125°C

BOLDFACE TYPE

Boldface entries indicate products recommended for new design.

ASTERISK

*Denotes new product since the publication of the most recent Databook.

Analog Devices designs, manufactures and sells worldwide sophisticated electronic components and subsystems for use in real-world signal processing. More than six hundred standard products are produced in manufacturing facilities located throughout the world. These facilities encompass all relevant technologies, including several embodiments of CMOS, BiMOS, bipolar and hybrid integrated circuits, each optimized for specific attributes—and assembled products in the form of potted modules, printed-circuit boards and instrument packages.

State-of-the-art technologies have been utilized (and in many cases invented) to provide timely, reliable, easy-to-use advanced designs at realistic prices. Our popular IC products are available in both conventional and surface mount packages (SO, LCC, PLCC), and many of our assembled products employ surface mount technology to reduce manufacturing costs and overall size. More than twenty years of successful applications experience and continuing vertical integration insure that these products are oriented to user needs. The ongoing application of today's state-of-the-art and the invention of tomorrow's state-of-the-art processes strengthen the leadership position of Analog Devices in standard data acquisition and signal processing products and make us a strong contender in high performance, mixed signal ASICs.

NEW PRODUCTS FOR 1990

Analog Devices has made significant investments in the past few years to develop major new process and design technologies which have allowed us to expand our product lines extensively into many new areas such as video displays, digital audio, disk drive data retrieval and telecommunications. These new capabilities have also allowed us to offer higher performance and lower cost products in our traditional data acquisition and signal processing lines. They are all classified and summarized in this Guide, along with existing products which are suitable for new designs. New products will be marked with an "*" in the listings, and those which are not in the most recent Databooks are described in a special section of this book which includes their major features and a block diagram.

The primary thrust for new products is in the very high speed and video areas with fast new DACs, ADCs and amplifiers directed primarily at display, signal processing, radar, ATE, disk drive and communications applications. Our DSP offerings have also been enhanced greatly by the ADSP-2100A, 12.5 MIPS Microprocessor.

TECHNICAL SUPPORT

Our extensive technical literature discusses the technology and applications of products for precision measurement and control and dynamic signal processing. In addition to tutorial material and comprehensive data sheets, we offer application notes, application guides, technical handbooks and several serial publications; for example, *Analog Productlog* provides brief information on new products being introduced and *Analog Dialogue*, our technical magazine, provides in-depth discussions of new developments in analog and digital circuit technology as applied to data acquisition, signal processing, control and test. In addition to the Databooks and general short form selection guides such as this one, we also publish several short form catalogs on specific product families. Analog Devices also provides in-depth technical support through our sales offices and with a network of applications engineers available at our factory locations to discuss our products and your applications. A call to our central office in Norwood, Massachusetts will be directed to the engineer most closely associated with your interests.

SALES OFFICES

Backing up our design and manufacturing capabilities and our extensive array of publications is a network of sales offices and representatives throughout the United States and most of the world. They are staffed by experienced sales and applications engineers, and many of them maintain a local stock of Analog Devices products. Our Worldwide Service Directory, as of the publication date, appears on pages 69 and 70 at the back of the book.

RELIABILITY

The manufacture of reliable products is a key objective at Analog Devices. We maintain facilities that have

been qualified under such standards as MIL-M-38510 for ICs in the U.S. and Ireland, and MIL-STD-1772 for hybrids. More than 14 of our products—both proprietary and second-source—have qualified for JAN part numbers; others are in the process. We have also specified and qualified over 100 products under the DESC and MIL-STD drawing programs. Most of our ICs are available in versions that comply fully with MIL-STD-883C Class B. An up-to-date listing of the products available under all of these programs begins on page 57 of this Designers' Guide. The detail specifications for products available in these various programs are published in our *Military Products Databook* for designers who specify ICs and hybrids for military contracts (the 1990 issue contains data on nearly 200 available product families). A newsletter, *Analog Briefings*, provides current information about the status of reliability at ADI and the most recent listings of product availability.

Our PLUS program makes available, at a small premium standard devices (commercial and industrial grades, plastic or ceramic packaging) for any user with demanding application environments. Subjected to stringent screening, similar to MIL-STD-883 test methods, they are often suffixed "/+" and are available from stock.

PRODUCTS NOT FOUND IN THE SELECTION GUIDES

For maximum usefulness to designers of new equipment, we have limited the contents of selection guides to products most likely to be used for the design of new circuits and systems. If the model number of a product you are interested in is not in the selection guides, turn to page 67 at the back of this volume where you will find a list of older products for which data sheets are available upon request. On page 68, you will find a guide to substitutions for products no longer available.

PRICES

Accurate, up-to-date prices are an important consideration in making a choice among the many available product families. Since prices are subject to change, current price lists and/or quotations are available upon request from our sales offices.

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Digital-to-Analog Converters

Voltage Output DACs

Model	Res Bits	Settling Time μ s typ	Bus Interface Bits ¹	Reference Voltage Int/Ext (M) ²	Package Options ³	Temp Range ⁴	Page	Comments	Price 100s \$
AD557	8	0.8	8, μ P	Int	N, P	C	C	Lowest Cost 8-Bit DACPORT™; Single +5 V Supply	3.35
AD7569	8	1	8, μ P	Int	E, N, P, Q	C, I, M	C	CMOS, Complete 8-Bit DAC/ADC/SHA/Reference	6.00
AD558	8	3	8, μ P	Int	D, E, N, P	C, M	C	10 V Out DACPORT. Single or Dual Supply	5.95
AD7224	8	7	8, μ P	2–12.5 V, Ext	E, N, P, Q	C, I, M	C	CMOS, Low Cost 8-Bit DAC	4.95
AD662	12	3	12, μ P	2.0 V, Int	N, Q	C, I, M	C	Complete 12-Bit DACPORT™; Single +5 V Supply	7.15
AD DAC80-V	12	3	12	6.3 V, Int	D	C	C	Improved Industry Standard	14.74
AD DAC85-V	12	3	12	6.3 V, Int	D	I, M	C	Improved Industry Standard	36.00
AD DAC87-V	12	3	12	6.3 V, Int	D	I, M	C	Improved Industry Standard	80.25
AD667	12	3	4/8/12, μ P	10 V, Int	D, E, N, P	C, I, M	C	Highest Accuracy Complete 12-Bit DAC	11.95
AD767	12	3	12, μ P	10 V, Int	D, N	C, I, M	C	Fastest Interface Complete 12-Bit DAC	9.85
AD7848	12	4	12, μ P	3 V, Int	E, N, P, Q	C, I, M	C	CMOS, Complete 12-Bit DAC with DSP Interface	7.40
AD7845	12	5	12, μ P	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, 12-Bit Multiplying DAC with Output Amplifier	7.40
AD7245	12	10	12, μ P	5 V, Int	E, N, P, Q	C, I, M	C	CMOS, 12-Bit Complete DAC, Parallel Load	9.85
AD7248	12	10	8, μ P	5 V, Int	E, N, P, Q	C, I, M	C	CMOS, 12-Bit Complete DAC, Byte Load	9.85
AD7840	14	4	14/Serial, μ P	3 V, Int	E, N, P, Q	C, I, M	C	CMOS, 14-Bit Complete DAC, Parallel or Serial Load	10.50
*AD766	16	1.5	Serial, μ P	Int	N, Q	C, I, M	SF-44	Zero Chip Interface 16-Bit DAC	18.45
AD1856	16	1.5	Serial, μ P	Int	N, R	C	C	16-Bit PCM Audio DAC	12.60
AD569	16	3	8/16, μ P	± 5 V, Ext (M)	D, N	I, M	C	Monolithic, 16-Bit Monotonic DAC	28.00
AD DAC71-V	16	5	16	6.3 V, Int	D, H	C	C	High Resolution 16-Bit DAC	50.00
AD DAC72-V	16	5	16	6.3 V, Int	D, H	C, I	C	High Resolution 16-Bit DAC	59.00
AD7846	16	6	16, μ P	Ext (M)	D, E, N, P	C, I, M	C	CMOS, 16-Bit Multiplying DAC with Readback Capability	19.00
AD1145	16	6	8/16/Serial, μ P	3–6 V, Ext	G, PLLCC ⁴	I	C	High Accuracy, Single Supply, Low Power	29.50
DAC1136	16	8	16	6 V, Int	Module	I	C	High Resolution and Accuracy	256.00
AD1147	16	20	16, μ P	10 V, Int	D	I	C	Internal 8-Bit Latched Input DACs for Offset and Gain Adjust	152.00
AD1148	16	20	16, μ P	10 V, Int	D	I	C	Separate 8-Bit Bus for Internal Offset and Gain Adjust DACs	138.00
AD1860	18	1.5	Serial, μ P	Int	N, R	C	C	18-Bit PCM Audio DAC	18.90
DAC1138	18	10	18	6 V, Int	Module	C	C	High Resolution and Accuracy	817.00
AD1139	18	40	8, μ P	–10 V, Int	D	C	C	True 18-Bit Accuracy	195.00

DACPORT is a trademark of Analog Devices, Inc.

Current Output DACs

Model	Res Bits	Settling Time μ s typ	Bus Interface Bits ¹	Reference Volt Int/Ext (M) ²	Package Options ³	Temp Range ⁴	Page	Comments	Price 100s \$
AD9768	8	0.005	8, μ P	-1.26 V, Int	D, E	C, M	C	Ultrahigh Speed, ECL Compatible, 20 mA Output Current	40.00
AD7524	8	0.1	8, μ P	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, Low Cost, 8-Bit Multiplying DAC with Latch	4.50
AD561	10	0.25	10	Int	D, N	C, M	C	Industry Standard 10-Bit DAC, JAN Part Available	19.55
AD7533	10	0.6	10	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, Low Cost 10-Bit Multiplying DAC	4.00
*AD9712	12	0.030	12	-1.2 V, Int	N, P	C	PC	ECL Compatible Inputs, Low Glitch Energy	40.00
*AD9713	12	0.030	12	-1.2 V, Int	N, P	C	PC	TTL Compatible Inputs, Low Glitch Energy	40.00
AD568	12	0.035	12	Int	Q	C, M	C	Highest Accuracy 12-Bit Ultrahigh Speed DAC	35.00
*AD668	12	0.05	12	Ext (M)	Q	C, M	PC	Multiplying 12-Bit Ultrahigh Speed DAC	†
AD565A	12	0.25	12	10 V, Int	D	C, I, M	C	Industry Workhorse High Speed DAC; JAN Part Available	15.95
AD DAC80-I	12	0.3	12	6.3 V, Int	D	C	C	Industry Standard, High Speed DAC	15.50
AD DAC85-I	12	0.3	12	6.3 V, Int	D	I, M	C	Improved Industry Standard	36.00
AD DAC87-I	12	0.3	12	6.3 V, Int	D	I, M	C	Improved Industry Standard	95.00
AD566A	12	0.35	12	10 V, Ext	D	C, M	C	High Speed DAC	12.95
AD7541A	12	0.6	12	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, 12-Bit Multiplying DAC	8.95
AD7548	12	1	8, μ P	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, Byte Load 12-Bit DAC, Specified with Single and Dual Supplies	9.48
AD562	12	1.5	12	Ext	D	C, I, M	C	Industry Standard, JAN Part Available	50.65
AD563	12	1.5	12	2.5 V, Int	D	C, M	C	Industry Standard	35.00
AD7542	12	2.0	4, μ P	Ext (M)	D, E, N, P	C, I, M	C	CMOS, Nibble Load 12-Bit Multiplying DAC	14.25
AD7543	12	2.0	Serial, μ P	Ext (M)	D, E, N, P, Q	C, I, M	C	CMOS, Serial Load 12-Bit Multiplying DAC	14.25
AD7545	12	2.0	12, μ P	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, Parallel Load 12-Bit Multiplying DAC	8.00
AD7545A	12	1.0	12, μ P	Ext (M)	E, N, P, Q	C, I, M	C	CMOS, Improved AD7545	7.55
AD7534	14	1.5	8, μ P	Ext (M)	D, N, P	C, I, M	C	CMOS, Byte Load	16.95
AD7535	14	1.5	8/14, μ P	Ext (M)	D, E, N, P	C, I, M	C	CMOS, Parallel or Byte Load	18.95
AD7536	14	1.5	8/14, μ P	Ext (M)	D, E, N, P	C, I, M	C	CMOS, Parallel or Byte Load, Bipolar Output	18.95
AD7538	14	1.5	14, μ P	Ext (M)	N, Q	C, I, M	C	CMOS, Parallel Load	10.50
AD1856	16	0.35	Serial, μ P	Int	N, R	C	C	16-Bit PCM Audio DAC	12.60
AD DAC71-I	16	1	16	6.3 V, Int	D, H	C	C	High Resolution 16-Bit DAC	44.00
AD DAC72-I	16	1	16	6.3 V, Int	D, H	C, I	C	High Resolution 16-Bit DAC	52.00
AD1860	18	0.35	Serial, μ P	Int	N, R	C	C	18-Bit PCM Audio DAC	18.90

¹This column lists the data format for the bus with " μ P" indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μ P indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

²Ext indicates external reference with the range of voltages listed where applicable. Ext (M) indicates external reference with multiplying capability. Int indicates reference is internal. A voltage value is given if the reference is pinned out.

³Package Options: D—Side-Braced Dual-In-Line Ceramic; E—Leadless Chip Carrier; H—Round Hermetic Metal Can (Header); M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Plastic Small Outline (SOIC).

⁴Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M—Military, -55°C to +125°C.

⁵PLLCC = Plastic Leadless Chip Carrier.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Digital-to-Analog Converters

Video DACs

Model	Res Bits	Update Rate MHz min	Palette Size	External Reference	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
ADV476	6	66, 50, 35	256	I	N	C	C	CMOS, Triple 6-Bit Color Palette RAM-DAC	6.50
ADV471	6	80, 50, 35	256	V/I	P	C	C	CMOS, Triple 6-Bit Color Palette RAM-DAC	7.00
ADV478	8	80, 50, 35	256	V/I	P	C	C	CMOS, Triple 8-Bit Color Palette RAM-DAC	15.00
ADV453	8	66, 40	256	V	N, P	C	C	CMOS, Triple 8-Bit Color Palette RAM-DAC	25.00
*ADV7120	8	80, 50, 30	—	V	N, P	C	SF-44	CMOS, Triple 8-Bit Video DAC	20.00
*ADV7121	10	80, 50, 30	—	V	N, P	C	SF-44	CMOS, Triple 10-Bit Video DAC	27.00
*ADV7122	10	80, 50, 30	—	V	N, P	C	SF-44	CMOS, Triple 10-Bit Video DAC	28.00

LOGDAC™

Model	Res dB	Full Scale Range dB	Accuracy dB	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD7111	0.375	88.5	0.17	E, N, Q	C, I, M	C	Low Distortion	16.80

LOGDAC is a trademark of Analog Devices, Inc.

Multiple DACs

Model	Res Bits	Out Mode V/I	Settling Time μ s typ	Bus Interface Bits ⁴	Reference Volt Int/Ext ¹	# DACs	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD7669	8	V	1	8, μ P	Int	2	N, P	C, I, M	C	CMOS, Complete 8-Bit Dual DAC/ADC/SHA/Reference	9.50
AD7769	8	V	2.5	8, μ P	Ext	2	N, P	C, I	C	CMOS, Complete 8-Bit Dual DAC/2-Channel ADC	9.50
AD7225	8	V	5	8, μ P	2–12.5 V, Ext	4	E, N, P, Q	C, I, M	C	CMOS, Separate Reference for Each DAC	18.50
AD7228	8	V	5	8, μ P	2–10 V, Ext	8	E, N, P, Q	C, I, M	C	CMOS, Specified with Single and Dual Supplies, Skinny 20-Pin Package	32.00
AD7226	8	V	7	8, μ P	2–12.5 V, Ext	4	E, N, P, Q, R	C, I, M	C	CMOS, No User Trims, Specified with Single and Dual Supplies	18.50
AD392	12	V	4	12, μ P	Int	4	M	C	C	Fast Bus Access Time (<40 ns), Data Readback Capability	99.00
*AD7837	12	V	5	8, μ P	Ext (M)	2	N, P, Q	C, I, M	SF-45	CMOS, Byte Load, Double Buffered	15.50
*AD7847	12	V	5	12, μ P	Ext (M)	2	N, P, Q	C, I, M	SF-45	CMOS, Parallel Load	15.50
AD390	12	V	8	12, μ P	+10 V, Int	4	D	C, M	C	Factory Trimmed Gain and Offset	123.40
*AD7237	12	V	10	8, μ P	Int (+5 V), Ext	2	N, P, Q	C, I, M	PC	CMOS, Complete 12-Bit Dual, Byte Load	17.00
*AD7247	12	V	10	12, μ P	Int (+5 V), Ext	2	N, P, Q	C, I, M	PC	CMOS, Complete 12-Bit Dual, Parallel Load	17.00
AD664	12	V	10	12, μ P	\pm 14.5 V, Ext (M)	4	D, E, N, P	C, I, M	C	Readback, Reset, Low Power Quad DAC	52.00
AD394	12	V	15	12, μ P	\pm 11 V, Ext (M)	4	D	C, M	C	Four Independent Reference Inputs, Precision Amps for Bipolar Output	117.30
AD395	12	V	15	12, μ P	\pm 11 V, Ext (M)	4	D	C, M	C	Four Independent Reference Inputs, Precision Amps for Unipolar Output	117.30
AD396	14	V	15	8, μ P	\pm 11 V, Ext (M)	4	D	C, M	C	Four Independent Reference Inputs, Bipolar Output, Simultaneous Update	163.20
AD7528	8	I	0.2	8, μ P	Ext (M)	2	E, N, P, Q, R	C, I, M	C	CMOS, +5 V to +15 V Operation, TTL Compatible at $V_{DD} = 5$ V	5.95
AD7628	8	I	0.35	8, μ P	Ext (M)	2	E, N, P, Q	C, I, M	C	CMOS, +12 V to +15 V Operation, TTL Compatible at $V_{DD} = 12$ V to 15 V	2.46
AD7537	12	I	1.5	8, μ P	Ext (M)	2	E, N, P, Q	C, I, M	C	CMOS, Byte Load, Double Buffered	14.50
AD7547	12	I	1.5	12, μ P	Ext (M)	2	E, N, P, Q	C, I, M	C	CMOS, Parallel Load	14.50
AD7549	12	I	1.5	4, μ P	Ext (M)	2	D, E, N, P	C, I, M	C	CMOS, Nibble Load, Double Buffered	16.95

¹Ext indicates external reference with the range of voltages listed where applicable. Ext (M) indicates external reference with multiplying capability. Int indicates reference is internal. A voltage value is given if the reference is pinned out.

²Package Options: D—Side-Brazed Dual-In-Line Ceramic; E—Leadless Chip Carrier; M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Small Outline Plastic (SOIC).

³Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M—Military, –55°C to +125°C.

⁴This column lists the data format for the bus with “ μ P” indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μ P indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

Analog-to-Digital Converters

Sampling ADCs

Model	Res Bits	Conv Time μ s max	SHA BW kHz typ ¹	Reference Volt Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD7821	8	0.66	100	0–5 V, Ext	8, μ P	N, P, Q	C, I	C	CMOS, Bipolar or Unipolar Operation	9.95
AD7569	8	2	200	Int	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Complete I/O Port with DAC, ADC, SHA, Amps and Reference	6.00
AD7669	8	2	200	Int	8, μ P	N, P	C, I, M	C	CMOS, Complete I/O Port with 2 DACs, ADC, SHA, Amps and Reference	9.50
*AD7769	8	3	200	Ext	8, μ P	N, P	C	SF-43	CMOS, Analog I/O Port with 2-Channel ADC for ± 10 V Input Signals	11.00
AD7820	8	2	7	0–5 V, Ext	8, μ P	E, N, P, Q, R	C, I, M	C	CMOS, 8-Bit Sampling ADC	9.95
AD7824	8	2.5	10	0–5 V, Ext	8, μ P	N, Q	C, I, M	C	CMOS, 4-Channel, 8-Bit Sampling ADC	10.45
AD7828	8	2.5	10	0–5 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, 8-Channel, 8-Bit Sampling ADC	10.95
AD7575	8	5	50	1.23 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost	5.50
AD7579	10	18.5	25	2.5 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost 10-Bit Sampling ADC	9.00
AD7580	10	18.5	25	2.5 V, Ext	10, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost 10-Bit Sampling ADC	9.00
AD9005	12	0.1	38000	Int	12	M	C, M	C	Complete 12-Bit ADC with T/H, Reference and Timing Circuitry	800.00
AD9003	12	1	10000	Int	12	M	C	C	12-Bit, 1 MSPS ADC, Single 40-Pin DIP	250.00
AD678	12	5	1000	5 V, Int	8/12, μ P	D, N, P	C, M	C	BiMOS, High Impedance High Bandwidth Sampling Input, 10 V Range, AC/DC Tested	†
AD1678	12	5	1000	5 V, Int	8/12, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Range, AC Tested	38.00
*AD7874	12	7.5	500	Int (+3 V)/Ext	12, μ P	N, P, Q	C, I, M	SF-46	CMOS, Multiplexed Four Channel ADC for ± 10 V Input Signals	35.00
AD1332	12	8	125	–5 V, Int	12, μ P	D	I	C	Complete 12-Bit 125 kHz Sampling ADC for Digital Signal Processing	142.80
*AD7868	12	8	500	Int (+3 V)	Serial, μ P	Q	C, I, M	SF-43	CMOS, Complete I/O Port with 12-Bit ADC and 12-Bit DAC	35.00
AD7870	12	8	500	3 V, Int	8/12/Serial, μ P	N, P, Q	C, I, M	C	CMOS, 100 kHz Throughput Rate	20.00
*AD7875	12	8	500	Int (+3 V)	8/12/Serial, μ P	N, P, Q	I, M	SF-46	CMOS Complete 12-Bit ADC for Input Signals at ± 5 V	20.00
*AD7876	12	8	500	Int (+3 V)	8/12/Serial, μ P	N, P, Q	I, M	SF-46	CMOS Complete 12-Bit ADC for Input Signals at ± 5 V	20.00
AD7878	12	8	500	3 V, Int	12, μ P	E, N, P, Q	C, I, M	C	CMOS, 100 kHz Throughput, On-Chip FIFO	28.00
AD1334	12	15	235	–5 V, Int	12, μ P	D	I	C	Four-Channel 65 kHz 12-Bit Sampling ADC for Digital Signal Processing	180.00
AD368	12	15	40–1000	6.3 V, Int	12	D	I, M	C	Complete 12-Bit ADC with Programmable Gains of 1, 8, 64, 512	99.95
AD369	12	15	40–1000	6.3 V, Int	12	D	I	C	Complete 12-Bit ADC with Programmable Gains of 1, 10, 100, 500	109.15

Model	Res Bits	Conv Time μ s max	SHA BW kHz typ ¹	Reference Volt Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD363R	12	40	X	10 V, Int	12, μ P	D	C, M	C	16-Channel, 12-Bit DAS	262.15
AD364R	12	50	X	10 V, Int	12, μ P	D	C, M	C	High Speed, 16-Channel, 12-Bit DAS with Three-State Buffered Output	163.20
AD679	14	10	1000	5 V, Int	8, μ P	D, N, P	C, M	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC/DC Tested	49.00
AD1679	14	10	1000	5 V, Int	8, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC Tested	39.00
*AD779	14	10	1000	5 V, Int	14, μ P	D, N	C, M	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range AC/DC Tested	49.00
*AD1779	14	10	1000	5 V, Int	14, μ P	D, N	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC Tested	39.00
AD7871	14	10	X	3 V, Int	8/14/Serial, μ P	N, P, Q	C, I, M	C	CMOS, 14-Bit, Complete Sampling ADC	39.00
AD7872	14	10	X	3 V, Int	Serial, μ P	N, Q, R	C, I, M	C	CMOS, 14-Bit, Complete Sampling ADC with Serial Output	34.00
DAS1152	14	40	X	10 V, Int	14	D	I	C	14-Bit High Accuracy Sampling ADC	209.00
DAS1157	14	55	X	10 V, Int	14	D	I	C	Low Power, 14-Bit Sampling ADC	219.00
DAS1153	15	50	X	10 V, Int	15	D	I	C	15-Bit High Accuracy Sampling ADC	261.00
DAS1158	15	55	X	10 V, Int	15	D	I	C	Low Power, 15-Bit Sampling ADC	263.00
AD1380	16	20	900	Int	16/Serial	D	C	C	Low Cost, 16-Bit Sampling ADC; Operation Over -55°C to +85°C Temperature Range	157.00
DAS1159	16	55	X	10 V, Int	16	D	I	C	Low Power, 16-Bit Sampling ADC	289.00
AD1330	18	10	50		16	D	C	SF-37	Floating Point, 12-Bit Significant and 6-Bit Exponent	310.00

¹X indicates that the internal SHA bandwidth is not specified in kHz.

²Ext indicates external reference with the range of voltages listed where applicable. Ext (M) indicates external reference with multiplying capability. Int indicates reference is internal. A voltage value is given if the reference is pinned out.

³This column lists the data format for the bus with " μ P" indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μ P indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

⁴Package Options: D—Side-Brazed Dual-In-Line Ceramic; E—Leadless Chip Carrier; M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Small Outline Plastic (SOIC).

⁵Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M—Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Analog-to-Digital Converters

General Purpose ADCs

Model	Res Bits	Conv Time μ s	Int SHA BW kHz ¹	Reference Voltage Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD7821	8	0.66	100	0-5 V, Ext	8, μ P	N, P, Q	C, I	C	CMOS, Bipolar or Unipolar Operation	9.95
AD7569	8	2	200	Int	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Complete I/O Port with DAC, ADC, SHA, Amps and Reference	6.00
AD7669	8	2	200	Int	8, μ P	N, P	C, I, M	C	CMOS, Complete I/O Port with 2 DACs, ADC, SHA, Amps and Reference	9.50
AD7820	8	2	7	0-5 V, Ext	8, μ P	E, N, P, Q, R	C, I, M	C	CMOS, 8-Bit Sampling ADC	9.95
*AD7769	8	2.5	200	Ext	8, μ P	N, P	C, I	C	CMOS, Two-Channel ADC/DAC with Output Amplifiers	11.00
AD7824	8	2.5	10	0-5 V, Ext	8, μ P	N, Q	C, I, M	C	CMOS, 4 Channel, 8-Bit Sampling ADC	10.45
AD7828	8	2.5	10	0-5 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, 8 Channel, 8-Bit Sampling ADC	10.95
AD7575	8	5	50	1.23 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost	5.50
AD670	8	10		Int	8, μ P	D, E, N, P	C, I, M	C	Single Supply, Including In-Amp and Reference	5.95
AD7576	8	10		1.23 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost	4.50
AD570	8	25		Int	8	D	C, M	C		22.25
AD673	8	30		Int	8, μ P	D, N, P	C, M	C		7.90
AD7581	8	66.7		-5 V-(-15 V), Ext	8, μ P	D, N	C, I	C	CMOS 8-Bit ADC	13.90
AD579	10	1.8		10 V, Int	10/Serial	D, N	C, I	C	High Speed with Low Power	116.30
AD7579	10	18.5	25	2.5 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost 10-Bit Sampling ADC	9.00
AD7580	10	18.5	25	2.5 V, Ext	10, μ P	E, N, P, Q	C, I, M	C	CMOS, Low Cost 10-Bit Sampling ADC	9.00
AD571	10	25		Int	10	D	C, M	C		35.15
AD573	10	30		Int	8/10, μ P	D, N, P	C, M	C	Complete 10-Bit ADC	13.90
AD575	10	30		Int	Serial	D, N	C, M	C	Complete 10-Bit ADC with Serial Output	12.75
AD9005	12	0.1	38000	Int	12	M	C, M	C	Complete 12-Bit ADC with T/H, Reference and Timing Circuitry	800.00
*AD671	12	0.5		5 V, Ext	12	D	C, M	SF-47	12-Bit 500 ns Monolithic ADC	†
AD9003	12	1	10000	Int	12	M	C	C	12-Bit, 1 MSPS ADC; Single 40-Pin DIP	250.00
AD578	12	3		10 V, Int	12	D, N	C, M	C	Complete, 3 μ s, 12-Bit ADC	101.00
*AD7572A	12	3		Ext	8/12, μ P	E, N, P, Q	C, I, M	SF-47	Improved Version of Industry Standard	25.00
AD7672	12	3		-5 V, Ext	12, μ P	E, N, P, Q	C, I, M	C	CMOS, Unipolar or Bipolar, -12 V, +5 V Supply	33.00
AD678	12	5	1000	5 V, Int	12, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Range, AD/DC Tested	†

Model	Res Bits	Conv Time μ s	Int SHA BW kHz ¹	Reference Voltage Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD1678	12	5	1000	5V, Int	8/12, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Range, AC Tested	38.00
AD5240	12	5		6.3 V, Int	12	D	C, I	C	Industry Standard	151.00
AD7572	12	5		-5.25 V, Int	12, μ P	E, N, P, Q	C, I, M	C	CMOS 12-Bit ADC	35.00
AD1332	12	8	125	-5 V, Int	12, μ P	D	I	C	Complete 12-Bit 125 kHz Sampling ADC for Digital Signal Processing	142.80
*AD7874	12	7.5	500	Int (+3 V)/Ext	12, μ P	N, P, Q	C, I, M	SF-46	CMOS, Multiplexed Four Channel ADC for ± 10 V Input Signals	35.00
*AD7875	12	8	500	3 V, Int	8/12/Serial, μ P	N, P, Q	I, M	SF-46	CMOS, Complete 12- Bit ADC for Input Signals of +5 V	25.00
*AD7876	12	8	500	3 V, Int	8/12/Serial, μ P	N, P, Q	I, M	SF-46	CMOS, Complete 12- Bit ADC for Input Signals of ± 10 V	25.00
*AD7868	12	8	500	3 V, Int	Serial, μ P	Q	C, I, M	SF-43	CMOS, Complete I/O Port with 12-Bit ADC and 12-Bit DAC	35.00
AD7870	12	8	500	3 V, Int	8/12/Serial, μ P	E, N, P, Q	C, I, M	C	CMOS, 100 kHz Throughput, Serial, Parallel, or Byte Output	20.00
AD7878	12	10	X	3 V, Int	12, μ P	E, N, P, Q	C, I, M	C	CMOS, 100 kHz Throughput, On-Chip FIFO; Serial, Parallel or Byte Output	28.00
AD7772	12	10	X	5.25, Int	Serial, μ P	E, N, P, Q	C, I, M	C	CMOS, Serial Output 12-Bit ADC	35.00
AD ADC84	12	10		6.3 V, Int	12	D	C	C	Industry Standard	73.00
AD ADC85	12	10		6.3 V, Int	12	D	C, I	C	Industry Standard	85.00
AD5210	12	13		-10 V, Int/Ext	12	D	I, M	C	Industry Standard	158.00
AD674A	12	15		10 V, Int	12, μ P	D	C, M	C	Complete 12-Bit ADC	39.25
AD368	12	15	40-1000	6.3 V, Int	12	D	I, M	C	Complete 12-Bit ADC with Programmable Gains of 1, 8, 64, 512	99.95
AD369	12	15	40-1000	6.3 V, Int	12	D	I	C	Complete 12-Bit ADC with Programmable Gains of 1, 10, 100, 500	109.15
AD1334	12	15	235	-5 V, Int	12, μ P	D	I	C	Four-Channel 65 kHz 12-Bit Sampling ADC for Digital Signal Processing	180.00
AD572	12	25		10 V, Int	12	D, M	I, M	C	12-Bit Successive Approximation ADC	113.20
AD ADC80	12	30		6.3 V, Int	12	D	I	C	Industry Standard	51.00
AD574A	12	35		10 V, Int	8/12, μ P	D, E, N, P	C, M	C	Complete ADC with Reference and Clock	27.90
AD5200	12	50		-10 V, Int/Ext	12	D	I, M	C	Industry Standard	†
AD7578	12	100		5 V, Ext	12, μ P	D, N	C, I, M	C	CMOS, 1 LSB Total Unadjusted Error	19.95

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³This column lists the data format for the bus with " μ P" indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μ P indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

⁴Package Options: D—Side-Brazed Dual-In-Line Ceramic; E—Leadless Chip Carrier; M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Small Outline Plastic (SOIC).

⁵Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M—Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Analog-to-Digital Converters

General Purpose ADCs

Model	Res Bits	Conv Time μ s	Int SHA BW kHz ¹	Reference Voltage Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD7582	12	100		5 V, Ext	12, μ P	D, E, N, P	C, I, M	C	CMOS, 1 LSB Total Unadjusted Error	22.95
AD679	14	10	1000	5 V, Int	8, μ P	D, N, P	C, M	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC/DC Tested	49.00
AD1679	14	10	1000	5 V, Int	8, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC Tested	39.00
AD779	14	10	1000	5 V, Int	14, μ P	D, N, P	C, M	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC/DC Tested	49.00
AD1779	14	10	1000	5 V, Int	14, μ P	D, N, P	C	C	BiMOS, High Impedance, High Bandwidth Sampling Input, 10 V Input Range, AC Tested	39.00
AD7871	14	10	X	3 V, Int	8/14/Serial, μ P	E, N, P, Q	C, I, M	C	CMOS, 14-Bit Complete Sampling ADC	39.00
AD7872	14	10	X	3 V, Int	Serial	N, Q, R	C, I, M	C	CMOS, 14-Bit Complete Sampling Serial ADC in 16-Pin DIP	34.00
ADC1131	14	12		Int	14	Module	C	C	14-Bit, High Speed ADC	325.00
ADC1130	14	25		Int	14	Module	C	C	14-Bit, High Speed ADC	271.00
DAS1152	14	40	X	10 V, Int	16	Module	I	C	14-Bit High Accuracy Sampling ADC	209.00
DAS1157	14	55	X	10 V, Int	16	Module	I	C	Low Power, 14-Bit Sampling ADC	219.00
DAS1153	15	50	X	10 V, Int	16	Module	I	C	15-Bit High Accuracy Sampling ADC	261.00
DAS1158	15	55	X	10 V, Int	16	Module	I	C	Low Power, 15-Bit Sampling ADC	263.00
AD1377	16	10	X	Int	16, Serial	D	C	C	Complete 16-Bit Converter; Industry Standard Pin Out	150.00
AD1376	16	15		Int	16, Serial	D	C	C	Complete, High Speed 16-Bit ADC Operation over -25°C to $+85^{\circ}\text{C}$	103.00
AD1380	16	20	900	Int	16, Serial	D	C	C	Low Cost, 16-Bit Sampling ADC Operation over -55°C to $+85^{\circ}\text{C}$ Temperature Range	159.00
ADC1140	16	35		10 V, Int	16	Module	C	C	16-Bit ADC, Operates over -25°C to $+85^{\circ}\text{C}$ Temperature Range	163.00
AD ADC71	16	50		6.3 V, Int	16	D, M	C	C	Industry Standard	66.00
AD ADC72	16	50		6.3 V, Int	16	D, M	C, I	C	Industry Standard	140.00
DAS1159	16	55	X	10 V, Int	16	D	I	C	Low Power, 16-Bit Sampling ADC	289.00
*AD7701	16	N/A	10 Hz	Ext (2.5 V)	Serial, μ P	N, P, Q	C, I, M	SF-47	CMOS, 16-Bit Charge Balancing ADC; Throughput Is 4 KSPS	15.00
AD1170	18	1000		5 V, Int	8	D	C	C	7 to 22-Bit Programmable Integrating ADC	98.00
AD1175K	22	50ms		6.95 V, Int/Ext	8	Module	C	C	High Accuracy, 22-Bit Integrating ADC	

Video ADCs

Model	Res Bits	Throughput Rate MSPS min	Full Power BW MHz typ	Reference Voltage Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD9006	6	470	250 (min)	±1 V, Ext	6, μ P	E, Z	C, M	C	470 MSPS, 6-Bit ADC; 8.5 pF Input Capacitance	200.00
AD9016	6	470	250 (min)	±1 V, Ext	6, μ P	E, Z	C, M	C	470 MSPS, 6-Bit ADC with On-Board Demultiplexing Circuitry	200.00
AD9000	6	50	20	0.5–2 V, Ext	6	D, E	C, M	C	MIL-STD-883, Rev. C, Devices Available; Low Error Rate	40.00
AD9028	8	300	250	–2 V, Ext	8	E	C, M	C	300 MSPS, 8-Bit ADC, Guaranteed Dynamic Performance	†
AD9038	8	300	250	–2 V, Ext	Dual 8	E	C, M	C	300 MSPS, 5-Bit ADC with On-Board 1:2 Demultiplexed Data Outputs	†
AD770	8	200	250	±2 V, Ext	8	D	C, M	C	High Bandwidth, Error Correction	150.00
AD9002	8	125	115 (Sm. Sig.)	0.1–(–2.1) Ext	8	D, E	I, M	C	Single Supply, Low Power, Low Input Capacitance, MIL-STD-883, Rev. C Device Available	90.00
AD9012	8	75	180	–2 V, Ext	8	Q, E	I, M	C	TTL Compatible Outputs	70.00
AD9048	8	35	15	–2 V, Ext	8, μ P	N, P, Q, Z	C, M	C	35 MSPS, 8-Bit Video ADC, 16 pF Input Capacitance	20.00
AD9502	8	13	7.5	Int	8	M	I	C	RS-170 Video Frame Grabber; Digitizes RS-170, NTSC, PAL Signals	300.00

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³This column lists the data format for the bus with “ μ P” indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μ P indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

⁴Package Options: D—Side-Brazed Dual-In-Line Ceramic; E—Leadless Chip Carrier; M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Small Outline Plastic (SOIC); Z—Ceramic Leaded Chip Carrier.

⁵Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M—Military, –55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Analog-to-Digital Converters

Multiplexed ADCs

Model	Res Bits	# Chan	Conv Time μ s	SHA BW kHz	Reference Volt Int/Ext ²	Bus Interface Bits ³	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD7824	8	4	2.5	10	0–5 V, Ext	8, μ P	N, Q	C, I, M	C	CMOS, On-Chip Track-Hold	10.45
*AD7770	8	6	2.5	100	Ext	8, μ P	N, P	C	SF-56	CMOS, I/O Port with Six-Channel 8-Bit ADC and 12-Bit DAC	†
AD7828	8	8	2.5	10	0–5 V, Ext	8, μ P	E, N, P, Q	C, I, M	C	CMOS, On-Chip Track-Hold	10.95
AD7581	8	8	66.7		–10 V, Ext	8, μ P	D, N	C, I	C	CMOS	13.90
*AD7874	12	4	7.5	500	Int (+3 V)/Ext	12, μ P	N, P, Q	C, I, M	SF-46	CMOS, Multiplexed Four-Channel ADC for ± 10 V Input Signals	35.00
AD1334	12	4	15	235	–5 V, Int	12, μ P	D	I	C	Four-Channel 65 kHz 12-Bit Sampling ADC for Digital Signal Processing	180.00
AD363R	12	16	40		10 V, Int	12, μ P	D	C, M	C	High Speed, 16-Channel, 12-Bit DAS	262.15
AD364R	12	16	50		10 V, Int	12, μ P	D	C, M	C	16-Channel, 12-Bit DAS with Three-State Buffers	163.20
AD7582	12	4	100		4 V–6 V, Ext	12, μ P	D, E, N, P	C, I, M	C	CMOS, 1 LSB Total Unadjusted Error	22.95

V/F and F/V Converters

Voltage-to-Frequency Converters

Model	Full-Scale Frequency MHz	Linearity % max	FS Calib Error % typ	Output Format	Input Range V	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
AD652	2	0.005–0.05	0.25–0.5	Pulse Train	0 to 10 0 to –10 ±5	P, Q	C, I, M	C	Synchronous, Multiple Input Ranges, Low Nonlinearity	7.30
AD650	1	0.005–0.1	5–10	Pulse Train	–10 to 0	D, N, P	C, I, M	C	Low Nonlinearity	7.95
AD654	0.5	0.1–0.4	10	Square Wave	0 to (V_S –4)	N, R	C	C	Single Supply, Low Cost	3.30
ADVFC32	0.5	0.01–0.2	5	Pulse Train	0 to 10	H, N	C, I, M	C	Industry Standard	5.95
AD537	0.15	0.07–0.25	5	Square Wave	– V_S to ($+V_S$ –4)	D, H	C, M	C		6.00

Frequency-to-Voltage Converters

Model	Input Range kHz	Linearity % max	Response Time ms typ	Package Options ⁴	Temp Range ⁵	Page	Comments	Price 100s \$
451	0 to 10	0.03–0.008	4	Module	I	N	Complete, No External Components	58.00
453	0 to 100	0.03–0.008	0.8	Module	I	N	Complete, No External Components	62.00
AD650	0 to 1000	0.005–0.1	–	Monolithic	C, I, M	C	Low Nonlinearity	7.95
ADVFC32	0 to 500	0.01–0.2	–	Monolithic	C, I, M	C	Industry Standard	5.95

¹X indicates that the internal SHA bandwidth is not specified in kHz.

²Ext indicates external reference with the range of voltages listed where applicable. Ext (M) indicates external reference with multiplying capability. Int indicates reference is internal. A voltage value is given if the reference is pinned out.

³This column lists the data format for the bus with “μP” indicating microprocessor capability—i.e., for a 12-bit converter 8/12, μP indicates that the data can be formatted for an 8-bit bus or can be in parallel (12 bits) and is microprocessor compatible.

⁴Package Options: D—Side-Brazed Dual-In-Line Ceramic; E—Leadless Chip Carrier; H—Round Hermetic Metal Can (Header); M—Metal Hermetic Dual-In-Line; N—Plastic Molded Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC); Q—Cerdip; R—Small Outline Plastic (SOIC).

⁵Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M—Military, –55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Synchro and Resolver Converters

Synchro, Resolver, Inductosyn[†] and LVDT-to-Digital Converters

Model	Res Bits	Input Format ¹	Accuracy arc mins	Tracking Rate Options revs/sec ²	Reference Frequency Options Hz	Input Isol	Package Options ³	Temp Range ⁴	Page	Comments	Price Single Piece \$
SDC/RDC1741	12	S, R	±15.3	18	400, 2.6 k	Yes	M	C, M	C	Tristate, Latched Output Internal Transformer Isolation	415/483
SDC/RDC1742	12	S, R	±8.5	18	400, 2.6 k	Yes	M	C, M	C	Tristate, Latched Output Internal Transformer Isolation	437/462
2S81	12	I, R	±30 ⁵	260	400→20 k	No	D	C	C	Monolithic, User Selectable Dynamic Characteristics High Tracking Rate, Quality Velocity Output	105
SDC/RDC1740	14	S, R	±5.3	12	400, 2.6 k	Yes	M	C, M	C	Tristate, Latched Output Internal Transformer Isolation	473/557
2S54	14	LVDT	±0.006 ⁶	360 LSB/ms ⁷	360→5 k	No	M	C, M	C	Direct Ratiometric Conversion of LVDT Signal, Selectable Input Gain. No External Trims	372/497
2S56	16	LVDT	±0.006 ⁵	360 LSB/ms ⁷	360→5 k	No	M	M	C	Direct Ratiometric Conversion of LVDT Signal, Selectable Input Gain. No External Trims	490/597
2S58	16	LVDT	±0.003 ⁶	680 LSB/ms ⁷	7k→11k	No	M	C, M	C	Direct Ratiometric Conversion of LVDT Signal, High Gain, Ultra-Linear	
2S80	16, 14, 12, 10 ⁸	I, R	±2, ±4, ±8	1040 ⁹	50→20 k	No	D	C, M	C	Monolithic, User Selectable Dynamic Characteristics, and Resolution High Tracking Rate and Quality Velocity Output	125/246
2S82	16, 14, 12, 10 ⁸	I, R	±2, ±4, ±8	1040 ⁹	50→20 k	No	P	C	C		120
2S50	11	LVDT	±0.025 ⁶	200 LSB/ms ⁷	400, 1 k→10 k	No	D, M	C, M	C	Direct Conversion of LVDT Signal, No External Trims Required, Tristate Output	112/168

Input Transformers

Model	Description	Frequency Hz	Accuracy arc mins	Input Voltage Options V rms ¹⁰	Package Options	Package Size Inches (mm)	Page	Price Single Piece \$
5S72	Ref Isolation for 2S80/81/82	360 to 3000	N/A	11.8, 26, 115	Module	1.12 × 1.12 × 0.4 (28.5 × 28.5 × 10.2)	C	59
5S70	Signal Isolation for 2S80/81/82	360 to 3000	±0.33 (typ) ±1.5 (max)	11.8, 26, 90	Module	2.25 × 1.12 × 0.4 (57.0 × 28.5 × 10.2)	C	88

Digital-to-Synchro and Resolver Converters

Model	Res Bits	Output Format ¹	Accuracy arc mins	Load Driving Capability	Reference Frequency Options Hz	Reference Input Volt Options V rms	Signal Output Volt Options V rms	Transformer Output Isolations	Package Options ³	Temp Range ⁴	Page	Comments	Price Single Piece \$
DRC1745	14	R ¹¹	±2, ±4 ¹²	2.0VA ¹³	dc→2600	0→3.4	0→6.8	Use Ext. STM 1680 and STM 1683 Transformer	M	M	C	Digital-to-Resolver Converter with Int. 2 VA Power Amplifier. Optional Int. TransZorb [‡] Protection. 2 Byte Latched Inputs.	542
*AD2S65	14	R	±2, ±4 ¹²	—	dc→2600	0→3.4	0→6.8	—	M	C, M	N	Digital-to-Resolver Converter. Auto-nulling (AN) Option	359
DRC1746	16	R ¹¹	±2, ±4 ¹²	2.0VA ¹³	dc→2600	0→3.4	0→6.8	Use Ext. STM 1680 and STM 1683 Transformer	M	M	C	16-Bit Version of DRC1745	691
*AD2S66	16	R	±1, ±2, ±4 ¹²	—	dc→2600	0→3.4	0→6.8	—	M	C, M	N	Digital-to-Resolver Converter. Auto-nulling (AN) Option	438

Digital Director

Model	Description	Frequency Hz	Output Drive VA	Accuracy Degrees	Output Voltage V rms	Package Size Inches (mm)	Page	Price Single Piece \$
6S04	Universal Synchro Simulator and Test Instrument	60 to 400	5 (60 Hz) 15 (400 Hz)	±0.1 (60 Hz) ±0.15 (400 Hz)	90 V Synchro (Coarse/Fine) 4.25 V Slab (Coarse) 11.8 V Slab (Fine)	18.3 × 17 × 7 (466 × 432 × 178)	C	25,898

¹S = Synchro; R = Resolver; I = Inductosyn.

²Revs/sec equivalent to pitches/sec in the case of an Inductosyn; in general higher reference frequency options have higher tracking rates.

³Package Options: D—Side-Brazed Dual-In-Line Ceramic; M—Metal Hermetic Dual-In-Line; P—Plastic Leaded Chip Carrier (PLCC).

⁴Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M—Military, -55°C to +125°C.

⁵Consult data sheet.

⁶LVDT converter accuracy given as % full scale linearity.

⁷Slew Rate (min).

⁸Resolution is user selectable.

⁹Depends on resolution selected.

¹⁰Synchro and resolver format available on all models.

¹¹Synchro format output with external output transformer STM1683.

¹²Depends on option.

¹³Can be used with pulsating power supply for reduced dissipation.

Boldface type: product recommended for new design.

*New product since the publication of the most recent Databooks.

[†]Inductosyn is a registered trademark of Farrand Industries, Inc.

[‡]TransZorb is a trademark of General Semiconductor Industries, Inc.

Sample/Track-Hold Amplifiers

Model	Specified Accuracy %	Acquisition Time μ s max	Aperture Time ns typ	Aperture Jitter ns typ	Droop Rate μ V/ μ s max	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD1154	0.00076	5.0	80	0.15	0.1	W	C, I	C	Low Cost 16-Bit Accurate, High Speed Amplifier	42.00
AD386	0.00076	4.1	12	0.040	0.1	D	C, M	C	High Resolution, High Speed Track-and-Hold Amplifier	79.00
AD389	0.003	2.5	30	0.4	0.1	D	C, I	C	High Resolution Track-and-Hold Amplifier	74.00
HTC-0300A	0.01	0.1	6	0.05	0.5	D	I, M	C	Ultrahigh Speed Track-and-Hold Amplifier	110.00
AD684	0.01	1.0	25	0.1	0.1	Q	C, I, M	C	Quad, Monolithic 1 μ s SHA	23.50
AD346	0.01	2.0	60	0.4	0.5	D	C, M	C	High Speed Sample-and-Hold	60.20
AD585	0.01	3.0	35	0.5	1	E, P, Q	C, I, M	C	High Speed, Precision. On-Board Hold Cap	9.15
AD583	0.01	5.0	50	5		D	C	C	5 μ s SHA	16.35
HTS-0010	0.10	0.019	2	0.005		D	C, I	C	Ultrahigh Speed Track-and-Hold Amplifier	337.00
HTS-0025	0.10	0.035	5	0.02		D	C, I	C	Ultrahigh Speed Track-and-Hold Amplifier	225.00
AD582	0.1	6.0	200	15		D, H	C, M	C	Low Cost, 15 μ s	7.80

Analog Switches & Multiplexers

CMOS Switches

Model	Function	Leakage Current nA max	R _{ON} Ω max	Latched	Package Options ¹	Temp Range ²	Page	Comments	Price \$
ADG201HS	Quad SPST	1	50		E, N, P, Q, R	C, I, M	C	CMOS, High-Speed Quad Switch. 44 V Supply Maximum Ratings	3.10
ADG201A	Quad SPST	1-2	90		E, N, P, Q, R	C, I, M	C	CMOS, 44 V Supply Maximum Ratings	2.68
ADG202A	Quad SPST	1-2	90		E, N, P, Q, R	C, I, M	C	CMOS, 44 V Supply Maximum Ratings	2.68
ADG221	Quad SPST	1-2	90	X	E, N, P, Q, R	C, I, M	C	CMOS, Latched Input, 44 V Supply Maximum Ratings	2.41
ADG222	Quad SPST	1-2	90	X	E, N, P, Q	C, I, M	C	CMOS, Latched Input, 44 V Supply Maximum Ratings	2.41
AD7510DI	Quad SPST	5-10	100		E, N, P, Q	C, M	C	DiCMOS, Dielectrically Isolated	5.80
AD7511DI	Quad SPST	5-10	100		E, N, P, Q	C, M	C	DiCMOS, Dielectrically Isolated	5.80
AD7590DI	Quad SPST	5	90	X	E, N, P, Q	C, I, M	C	DiCMOS, Latched, Dielectrically Isolated	4.95
AD7591DI	Quad SPST	5	90	X	E, N, P, Q	C, I, M	C	DiCMOS, Latched, Dielectrically Isolated	4.95
ADG211A	Quad SPST	5	115		N, P, R	C	C	CMOS, Low Cost, 44 V Supply Maximum Ratings	1.60
ADG212A	Quad SPST	5	115		N, P	C	C	CMOS, Low Cost, 44 V Supply Maximum Ratings	1.60
AD7512DI	Dual SPDT	5-10	100		E, N, P, Q	C, M	C	DiCMOS, Dielectrically Isolated	5.80
AD7592DI	Dual SPDT	5	90	X	E, N, P, Q	C, M	C	DiCMOS, Latched, Dielectrically Isolated	4.95

¹Package Options: D-Side-Brazed Dual-In-Line Ceramic; E Leadless Chip Carrier; H-Round Hermetic Metal Can (Header); N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC); Q-Cerdip; R-Small Outline Plastic (SOIC); W-Single Width DIP; Metal Case.

²Temperature Ranges: C-Commercial, 0 to +70°C; I-Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M-Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

Analog Switches & Multiplexers

Analog CMOS Multiplexers

Model	Function	Leakage Current nA max	R _{ON} Ω max	Latched	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
ADG506A	16:1	1	280		E, N, P, Q	C, I, M	C	Superior Second Source to DG506A	6.95
ADG526A	16:1	1	280	X	E, N, P, Q	C, I, M	C	Superior Second Source to DG526A	7.75
ADG507A	Dual 8:1	1	280		E, N, P, Q	C, I, M	C	Superior Second Source to DG507A	6.95
ADG527A	Dual 8:1	1	280	X	E, N, P, Q	C, I, M	C	Superior Second Source to DG527A	7.75
ADG508A	8:1	1	300		E, N, P, Q, R	C, I, M	C	Superior Second Source to DG508A	3.95
ADG528A	8:1	1	300	X	E, N, P, Q, R	C, I, M	C	Superior Second Source to DG528A	4.54
AD7501	8:1	1-5	300		E, N, Q	C, M	C		6.25
AD7503	8:1	1-5	300		E, N, Q	C, M	C		6.25
ADG509A	Dual 4:1	1	300		E, N, P, Q, R	C, I, M	C	Superior Second Source to DG509A	3.95
ADG529A	Dual 4:1	1	300	X	E, N, P, Q, R	C, I, M	C	Superior Second Source to DG529S	4.54
AD7502	Dual 4:1	1-5	300		E, N, Q	C, M	C		6.25

Video Multiplexer

Model	Function	Full Power BW MHz min	Crosstalk Rejection F = 10 MHz dB	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD9300	4:1	30	75	E, Q	C, M	C	Wideband Video Mux	8.00

Voltage References

Model	Output Voltage V	Initial Accuracy % FS max	Temp Stability ppm/°C max	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD589	+1.235	1.2–2.8	10–100	H	C, M	C	Two Terminal, 1.2 V Reference	1.40
AD580	+2.5	0.4–3	10–85	H	C, M	C	Precision, Three Terminal, 2.5 V Reference	2.50
AD1403	+2.5	0.4–1	25–40	N	C	C	Second Source, 2.5 V Reference	1.65
AD586	+5	0.05–0.4	5–25	Q, R	C, M	C	Precision, Buried Zener 5 V Reference	2.95
ADREF02	+5	0.3–0.5	8.5–25	Q	C, M	C	Second Source, 5 V Reference	2.95
AD689	+8.129	0.05–0.2	5–25	Q	C, M	C	Precision, 8.192 Volt Reference	2.95
AD2700	+10	0.025–0.05	3–10	D	C, M	C	Very High Precision 10 V Reference	22.45
AD581	+10	0.05–0.3	5–30	H	C, M	C	Three Terminal 10 V Bandgap Reference	3.45
AD587	+10	0.05–0.1	5–20	Q, R	C, M	C	Precision Buried Zener 10 V Reference	2.95
ADREF01	+10	0.3–0.5	8.5–25	Q	C, M	C	Second Source 10 V Reference	2.95
AD2710	+10	0.01	1–5	N	C	C	Ultrahigh Precision 10 V Reference	29.60
AD2712	±10	0.01	1–5	N	C	C	Ultrahigh Precision ±10 V Reference	35.70
AD2702	±10	0.025–0.05	3–10	D	C, M	C	Very High Precision ±10 V Reference over Full Military Temp Range	28.05
AD2701	–10	0.025–0.05	3–10	D	C, M	C	Very High Precision –10 V Reference	28.05
AD588	Selectable	0.01–0.03	1.5–4	D	I, M	C	Ultrahigh Precision, Monolithic Programmable Reference	12.75
AD584	Selectable	0.05–0.3	5–30	E, H	C, M	C	Precision, Programmable Bandgap Reference	3.90

Comparators

Model	Prop Delay ns max	Logic	V _{OS} mV max	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD96685	3.5	ECL	2	E, H, P, Q	I, M	L	Ultrafast	4.60
AD96687	3.5	ECL	2	E, P, Q	I, M	L	Dual AD96685	6.40
*AD790	45	TTL	0.25–1	N, Q, R	C, I, M	PL	Fast, Precise Single Supply	2.95
*AD9696	7.0	TTL	2	H, N, Q, R	C, M	SF-48	Single Comparator	3.50
*AD9698	7.0	TTL	2	H, Q, R	C, M	SF-48	Single Comparator	6.00

¹Package Options: D–Side-Brazed Dual-In-Line Ceramic; E–Leadless Chip Carrier; H–Round Hermetic Metal Can (Header); N–Plastic Molded Dual-In-Line; P–Plastic Leaded Chip Carrier (PLCC); Q–Cerdip; R–Small Outline Plastic (SOIC).

²Temperature Ranges: C–Commercial, 0 to +70°C; I–Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M–Military, –55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

Operational Amplifiers

Low Cost, General Purpose Amplifiers

Model	V _{OS} mV max	V _{OS} TC μV/°C max	I _B nA max	BW MHz typ ¹	SR V/μs typ	Settling Time μs 0.01% typ	Noise μV p-p 0.1–10 Hz typ	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD707	0.015–0.09	0.1–1	1–2.5	0.9	0.15	—	0.23	H, N, Q, R	C, I, M	PL	Very High DC Precision	1.25
*AD705	0.025–0.09	0.6–2.0	0.1–0.15	0.9	0.25	—	0.5	H, N, Q, R	C, I, M	SF-49	Low I _B Precision Bipolar	†
AD OP-07	0.025–0.15	0.6–2.5	3–12	0.6	0.17	—	0.35–0.38	H, N, Q, R	C, M	L	Improved Industry Standard	1.10
AD711	0.025–2	3–20	0.025–0.05	4	20	1	2	H, N, Q, R	C, I, M	L	Excellent Combination of AC and DC Performance at Very Competitive Prices	0.80
AD548	0.25–2	2–20	0.01–0.02	1	1.8	8	2	H, N, Q, R	C, I, M	L	Low Power, High Performance	0.75
AD542	0.5–2	5–20	0.025–0.05	1	3	—	2	H	C, M	L	High Performance BiFET	2.95
AD544	0.5–2	5–20	0.025–0.05	2	13	—	2	H	C, M	L	High Performance BiFET	3.10
AD741	3–6	20	200–500	1	0.5	—	—	H, N	C, I, M	L	Improved Second Source	1.55

Low Input Current Amplifiers

Model	I _B pA max	Input Impedance Differential Common Mode Ω pF typ		CMRR dB f=1 kHz typ	V _{OS} mV max	V _{OS} TC μV/°C max	BW MHz typ ¹	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD549	0.06–0.25	10 ¹³ 1	10 ¹⁵ 0.8	62	0.25–1	5–20	1	H	C, M	L	Monolithic, Lowest I _B	8.95
AD515A	0.075–0.3	10 ¹³ 1.6	10 ¹⁵ 0.8	62	1–3	15–50	1	H	C	L	Lower Cost AD515 Replacement	10.25
*AD546	0.5–1	10 ¹³ 1	10 ¹⁵ 0.8	62	1–2	20	1	N	C	SF-49	Precision Low Cost Electrometer	3.75
*AD645	1–2	10 ¹³ 1	10 ¹⁴ 3	—	0.25–0.5	1–5	2	H, N	C, I, M	SF-50	Low Noise, Precision BiFET	†
AD545A	1–2	10 ¹³ 1.6	10 ¹⁵ 0.8	62	0.25–1	3–25	1	H	C	N	Lower Cost AD545 Replacement	8.75
AD548	10–20	10 ¹² 3	3 × 10 ¹² 3	84	0.25–2	2–20	1	H, N, Q, R	C, I, M	L	Low Power, Low Cost	0.75
AD547	25–50	10 ¹² 6	10 ¹² 13	60	0.25–1	1–5	1	H	C, M	L	Low Drift	2.05
AD711	25–50	3 × 10 ¹² 5.5	3 × 10 ¹² 5.5	62	0.25–2	3–20	4	H, N, Q, R	C, I, M	L	Low Cost BiFET, Excellent AC and DC Performance	0.80

High Speed Amplifiers

Model	GBW MHz typ	SR V/ μ s typ	Settling Time ns to % typ	A _{CL} min V/V	V _{OS} mV typ	I _{OUT} mA min	Supply Current mA typ	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD5539	1400	600	12-1	+5, -4	2	11	25	N, Q	C, M	L	Improved Replacement for SE/NE5539	1.65
*AD844	900	2000	100-0.1	1	0.05	80	6.5	N, Q	I, M	SF-49	Constant 10 ns Rise Time for Any Pulse Input, Current Feedback	4.50
AD849	725	300	80-0.1	25	0.3	32 typ	5.1	N, Q, R	C, I, M	PL	High Speed, Low Power Preamp, Drives Capacitive Loads	2.95
AD846	450	450	110-0.01	1	0.025	65 typ	5	N, Q	I, M	PL	High Speed, Precision, Current Feedback	6.25
AD840	400	400	100-0.01	10	0.1	50	10.5	N, Q	C, M	PL	Wide Bandwidth Precision, Fast Settling, A _{VCL} \geq 10	4.50
AD9611	280	1900	13-0.01	1	0.5	40	21	H	I, M	L	Ultrafast Settling, Wide Bandwidth Current Feedback	84.00
*AD9617	180	1600	10-0.1	3	0.4	60	34	N, Q, R	C, I, M	N	Low Distortion, Wide Bandwidth, IMD \leq -70 dBc at 20 MHz	†
AD848	175	300	100-0.1	5	0.2	32 typ	5.1	N, Q, R	C, I, M	PL	High Speed, Low Power, Drives Capacitive Loads	2.95
*AD9618	160	1800	10-0.1	+5, -1	0.2	60	31	N, Q, R	C, I, M	N	Low Distortion, Wideband, IMD \leq -70 dBc at 20 MHz	†
AD9610	100	3500	18-0.1	1	0.3	50	21	H	I, M	L	Wide Bandwidth, Fast Settling	55.00
AD842	80	375	100-0.01	2	0.5	50	13	H, N, Q	C, M	PL	Fast Settling, High Current Output, Cable Driver, A _{VCL} \geq 2	6.95
AD847	50	300	120-0.1	1	0.5	32 typ	5.1	N, Q, R	C, I, M	PL	High Speed, Low Power, Drives Capacitive Loads	2.95
AD841	40	300	110-0.01	1	0.5	50	11	E, H, N, Q	C, M	PL	High Speed, Precision, Drives Capacitive Loads	6.00
*AD843	34	250	135-0.01	1	0.5	50	12	N, Q, H	C, I, M	SF-48	FET Input, Fast Settling, High Speed	8.80
AD845	16	100	350-0.01	1	0.7	50 typ	10	N, Q	C, I, M	PL	FET Input, Fast Settling, High Speed	4.50
AD744	13	75	500-0.01	+2, -1	0.3	25	3.5	H, N, Q, R	C, I, M	L	FET Input, Fast Settling, High Speed, Custom Compensation	2.25
AD746	13	75	500-0.01	+2, -1	0.3	25	3.5	H, N, Q, R	C, I, M	PL	Dual AD744	4.25
AD713	4	20	1000-0.01	1	0.3	25 typ	10	H, N, Q	C, I, M	PL	Quad AD711	3.50
AD711	3	16	1000-0.01	1	0.3	25 typ	2.5	H, N, Q, R	C, I, M	L	Precision BiFET	0.80
AD712	3	16	1000-0.01	1	0.3	25 typ	5	H, N, Q, R	C, I, M	L	Dual AD711	1.25

¹Unity gain small signal bandwidth.

²Package Options: E-Leadless Chip Carrier; H-Round Hermetic Metal Can (Header); N-Plastic Molded Dual-In-Line; Q-Cerdip; R-Small Outline Plastic (SOIC).

³Temperature Ranges: C-Commercial, 0 to +70°C; I-Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M-Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Operational Amplifiers

Precision Amplifiers

Model	V _{OS} μV max	V _{OS} TC μV/°C max	Noise μV p-p 0.1–10 Hz typ	GBW MHz typ	Slew Rate V/μs typ	I _B nA max	CMRR dB f = 1 kHz typ	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD707	5–100	0.03–0.3	0.23	0.9	0.3	0.5–2.5	140	H, N, Q, R	C, I, M	PL	Highest DC Precision	1.25
AD708	5–90	0.03–0.3	0.23	0.9	0.3	0.5–2.5	140	H, N, Q, R	C, I, M	PL	Dual AD707	2.95
*AD844	50–300	1–5	—	60	2000	450	—	N, Q	I, M	SF-49	Precision, High Speed	4.50
AD846	25–200	0.8–5.5	—	75	450	450	—	N, Q	I, M	PL	High Precision, High Speed	6.25
AD OP-07	25–100	0.6–2.5	0.35	0.6	0.17	2–12	95	H, N, Q, R	C, M	L	Improved Industry Standard	1.10
AD OP-27	25–100	0.6–1.8	0.08	8	2.8	40–80	123	H, N, Q	I, M	L	Ultralow Noise	3.30
AD OP-37	25–100	0.6–1.8	0.08	63 (GBP)	17	40–80	123	H, N, Q	I, M	L	Combines Precision and Speed	3.30
*AD705	25–90	0.6–2.0	0.5	0.9	0.25	0.1–0.15	110	N, Q, R	C, I, M	SF-49	Low I _B Precision Bipolar	†
AD517	50–100	1.3–3	2	0.25	0.1	0.25–2	94	H	C, M	L		3.90
AD547	250–1000	1–5	2	1	3	0.025–0.05	60	H	C, M	L	Low Drift BiFET	4.25
AD647	250–1000	2.5–10	4	1	3	0.035	76	E, H	C, M	L	Dual AD547	5.80
AD548	250–2000	2–20	2	1	1.8	0.03–0.015	83	H, N, Q, R	C, I, M	L	Low Power BiFET	0.75
AD648	100–2000	3–20	2	1	1.8	0.03–0.015	83	H, N, Q, R	C, I, M	L	Dual AD548	1.25

Low Noise Amplifiers

Model	Voltage Noise en typ 10 kHz nV/√Hz	Voltage Noise en typ 1 kHz nV/√Hz	Current Noise In ± In– typ 1 kHz pA/√Hz	I _B typ nA	V _{OS} typ mV	GBW typ MHz	SR typ V/μs	Settling Time ns to % typ	A _{CL} min V/V	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
*AD9617	1.3	2.0	45/45	12000	0.4	180	1600	10–0.1	3	N, Q, R	C, I, M	N	Low Distortion, Wide Bandwidth	†
*AD9618	1.3	2.0	45/45	10000	0.2	160	1800	10–0.1	+5, –1	N, Q, R	C, I, M	N	Low Distortion, Wide Bandwidth	†
*AD844	—	2	12/10	200	0.05	900	2000	100–0.1	1	N, Q	I, M	SF-49	Current Feedback Amplifier	4.50
AD846	—	2	6/20	100	0.025	450	450	110–0.01	1	N, Q	I, M	PL	Current Feedback, Precision	6.25
AD849	—	3	—	3300	0.3	725	300	80–0.1	25	N, Q, R	C, I, M	PL	High Speed, Low Power	2.95
AD OP-27	0.35	3	0.4/0.4	10	0.025	8	1.7	—	1	N, Q, H	I, M	L	Low Noise, Precision	3.80
AD OP-37	0.08	3	0.4/0.4	10	0.025	63	17	—	5	N, Q, H	I, M	L	Low Noise, Precision	3.80
AD5539	—	4	—	6000	2	1400	600	12–1	+5, –4	N, Q	C, M	L	Improved Replacement for NE5539	1.65
AD840	—	4	—	3500	0.1	400	400	100–0.01	10	N, Q	C, M	PL	Wide Bandwidth, Precision	4.50
AD848	—	5	—	3300	0.2	175	300	100–0.1	5	N, Q, R	C, I, M	PL	High Speed, Low Power	2.95
*AD645	40	8	0.5/0.5	0.001	—	2	2	—	1	H, N	C, I, M	SF-50	FET Input, Low I _B	†
AD9611	1.1	1.6	38/38	1000	0.5	280	1900	13–0.01	1	H	I, M	L	Ultrafast Settling, Wide Bandwidth	84.00
AD9610	0.7	1.6	32/32	5000	0.3	100	3500	18–0.1	1	H	I, M	L	Wide Bandwidth, Fast Settling	55.00

Dual Operational Amplifiers

Model	V _{OS} mV max	V _{OS} TC μV/°C max	I _B nA max	BW MHz typ ³	Slew Rate V/μs typ	Settling Time to 0.01% μs typ	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD708	0.03–0.1	0.3–1.0	1–2.5	0.9	0.3		H, N, Q	C, I, M	PL	Highest DC Precision; Excellent Matching Between Amps, Dual AD707	2.95
AD712	0.3–3	5–20	0.05–0.075	4	20	1	H, N, Q, R	C, I, M	L	Excellent AC and DC Performance Dual AD711	1.25
AD746	0.25–1	3–20	0.15	13	75	0.5	H, N, Q	C, I, M	PL	Precision, Fast Settling, Dual AD744	4.25
AD647	0.25–1	2.5–10	0.035–0.075	1	3		E, H	C, M	L	Dual AD547	5.80
AD648	0.3–2	3–20	0.01–0.02	1	1.8	8	H, N, Q	C, I, M	L	Low Power, BiFET, Dual AD548	1.25
AD642	0.5–2		0.035–0.075	1	3		H	C, M	L	Dual AD542	4.95
AD644	0.5–2		0.035–0.075	2	13		H	C, M	L	Dual AD544	5.20

Quad Operational Amplifier

Model	V _{OS} mV max	V _{OS} TC μV/°C max	I _B pA max	BW MHz typ ³	Slew Rate V/μs typ	Settling Time to 0.01% μs typ	Package Options ¹	Temp Ranges ²	Page	Comments	Price 100s \$
AD713	0.5–1.5	20	75–150	4	20	1	N, Q	C, I, M	PL	Superior AC and DC Performance, Quad AD711	3.50

¹Package Options: E—Leadless Chip Carrier; H—Round Hermetic Metal Can (Header); N—Plastic Molded Dual-In-Line; Q—Cerdip; R—Small Outline Plastic (SOIC).

²Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M—Military, –55°C to +125°C.

³Unity gain small signal bandwidth.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Instrumentation Amplifiers

Model	Gain Ranges	Gain Error % max	Gain TC ppm/°C max	BW MHz typ ¹	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD524	1, 10, 100, 1000	0.02–2.0	5–100	1.0	D, E	I, M	L	Pin Programmable, Input Protection	9.90
AD526	1, 2, 4, 8, 16	0.01–0.15	2–5	4.0	D, N	C, I, M	L	Software Programmable, μ P Interface	5.25
AD624	1, 100, 200, 500, 1000	0.02–1.0	5–25	1.0	D	I, M	L	Pin Programmable	11.90
AD625	1–10,000	0.02–0.05	5	0.65	D, N	C, I, M	L	Resistor Programmable, Low Cost	6.95
AD365	1, 10, 100, 500	0.05–0.1	5–10	0.8	M	I	L	Digitally Programmable with T/H	63.20
AD522	1–10,000	0.05–1.0	2–50	0.3	D	I, M	L	Resistor Programmable	36.70

Isolation Amplifiers

Model	Peak Volt Iso V pk	Gain Range V/V	Gain Nonlin % max	Freq Resp kHz	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
284J	2500	1–10	0.05	1	Module	C	L	Medical, Single Channel, Low Cost	63.00
286J	2500	1–100	0.05–0.2	1	Module	C	L	Medical, Multichannel, Low Cost	62.00
289	2500	1–100	0.012–0.05	20	Module	C	L	Precision, Wide Bandwidth, Synchronized	64.00
290A	1500	1–100	0.1–0.25	2.5	Module	I	L	Single Channel, General Purpose	43.00
292A	1500	1–100	0.1–0.25	2.5	Module	I	L	Multichannel, General Purpose	43.00
AD202	1000–2000	1–100	0.025–0.05	2	N, Y	C	L	Lowest Cost, Small Size, Single Channel, –40°C to +85°C	28.00
*AD203	2000	1–100	0.025	10	N	M	SF–50	Rugged, Military Temperature Range, Wide Bandwidth	58.00
AD204	1000–2000	1–100	0.025–0.05	5	N, Y	C	L	Lowest Cost, Small Size, Multichannel, –40°C to +85°C	25.00
*AD208	2000	1–1000	0.025	4	Y	I	SF–50	Precision, Low Cost, Single Channel, mV Input	†
AD210	3500	1–100	0.012–0.025	20	N	I, C	L	Precision, 3-Port Isolation, Wide Bandwidth	42.00
AD295	2500	1–1000	0.012–0.05	4.5	Module	I	L	–40°C to +100°C, Low Drift, 3-Port Isolation	78.00
281					Module	C	L	External Oscillator for 286J and 292A Isolation Amplifiers	33.00
AD246					N, Y	C	L	External Oscillator for AD204 Isolation Amplifier	10.00

Multipliers/Dividers

Model	BW MHz typ ¹	Total Error % FS max	Accuracy vs Temp %/°C typ	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD834	500	2	TBD	Q, R	C, M	PL	Very High Speed 4-Quad Mult/Div	19.20
AD539	60	1.5–2.5	1–2% (T_{min} – T_{max})	D, N	C, M	L	High Speed 2-Channel, 2-Quad Mult/Div	11.45
AD534	1	0.25–1.0	0.0008–0.022	D, E, H	C, M	L	High Accuracy 4 Quad Mult/Div	16.95
AD632	1	0.5–1.0	0.01–0.02	D, H	I, M	L	High Accuracy Replacement for AD532	16.40
AD532	1	1–2	0.01–0.04	D, H	C, M	L	Accurate 4-Quad Mult/Div	17.00
AD538	0.4	0.5–1.0		D	I, M	L	Simultaneous Mult/Div/Exponentiator	17.50
AD535	0.02	0.5–5.0	0.01–0.05	D, H	C	N	Dedicated Divider	20.35

RMS-to-DC Converters

Model	Conversion Accuracy mV \pm %Read max	Full-Scale Range V rms	dB Output Error dB max	Package Options ²	Temp Range ³	Page	Comments	Price 100s \$
AD737	(0.2 \pm 0.3)–(0.4 \pm 0.5)	0.2		N, Q, R	C, I	PL	Low Cost, Low Power, No Output Buffer	3.97
AD736	(0.3 \pm 0.3)–(0.5 \pm 0.5)	0.2		N, Q, R	C, I	PL	General Purpose, Low Cost, Low Power	3.97
AD636	(0.2 \pm 0.3)–(0.5 \pm 0.6)	0.2	0.2–0.5	D, H	C	L	Low Power	6.25
AD637	(0.5 \pm 0.2)–(1 \pm 0.5)	7	1 (typ)	D, Q	C, M	L	High Accuracy, Wide Bandwidth	8.60
AD536A	(2 \pm 0.2)–(5 \pm 0.5)	7	0.3–0.6	D, E, H	C, M	L	General Purpose	7.55

¹Unity gain small signal bandwidth.

²Package Options: D–Side-Brazed Dual-In-Line Ceramic; E–Leadless Chip Carrier; H–Round Hermetic Metal Can (Header); M–Metal Hermetic Dual-In-Line; N–Plastic Molded Dual-In-Line; Q–Cerdip; R–Small Outline Plastic (SOIC); Y–Single In-Line Package.

³Temperature Ranges: C–Commercial, 0 to +70°C; I–Industrial, –40°C to +85°C (Some older products –25°C to +85°C); M–Military, –55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Log/Antilog Amplifiers

Model	Input Range	Log Conformity % RTI	BW kHz	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
755	1 nA–1 mA	0.5	10	Module	I	L	Complete, Current and Voltage, 6 Decade, High Accuracy	64.00
757	1 nA–1 mA	0.5	25	Module	I	L	Complete, Log/Antilog Ratio, 6 Decade, High Accuracy	73.00
759	20 nA–0.2 mA	1.0	200	Module	I	L	Complete, Current and Voltage, 4 Decade, Lowest Cost	38.00
AD9521	0.4 V p-p	±1 dB	10–250 MHz	E, H	C, M	L	Wideband Amplifier with Logarithmic Detected Output	16.00
*AD640	0.75 mV–200 mV		120 MHz	D, E	I, M	SF-51	120 MHz, 45 dB, SDLA	64.00

Special Function Components

Model	Description	Package Options ¹	Temp Range ²	Page	Price 100s \$
AD345	High Speed Pin Driver with Inhibit Mode	Y	C	L	115.00
AD630	Balanced Modulator/Demodulator	D, E, N	C, I, M	L	6.55
AD639	Universal Trigonometric Function Converter	D	I	L	13.75
AD890	Precision Wideband Channel Processing Element	P, Q	C	PL	10.00
AD891	Rigid Disk Data Channel Qualifier	P, Q	C	PL	10.00
*AD7341	Voiceband Transmission Filter for 14-Bit DAC	N, P	C	SF-52	16.95
*AD7371	Voiceband Receive Filter for 14-Bit ADC	N, P	C	SF-52	20.55
AD9500	Digitally Programmable Delay Generator	E, P, Q	I, M	L	16.50
*AD9901	Digital Phase/Frequency Discriminator	E, Q	C, M	SF-52	8.75
*AD9501	TTL/CMOS Digitally Programmable Delay Generator	N, P, Q	C, M	SF-51	8.60

Temperature Transducers

Model	I _{OUT} μA/K	Cal Error °C max	Nonlin °C max	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AC2626	1	0.5–5	0.3–1.5	3/16" Stainless Steel Sheath	C, M	L	General Purpose Temperature Probe 4" and 6" Length	30.00
AD590	1	0.5–5	0.3–1.5	F, H	M+	L	Wide Temperature Range, Accurate	2.50
AD592	1	0.5–2.5	0.15–0.35	N	I+	L	Low Cost, Accurate	2.95

Signal Conditioning Components & Subsystems

Model	V/I Transmitters		Isolated	Sensor Excitation	Sensor Type(s)	IC	Hybrid Package	Module	Page	Price
	Loop Power	Local Power								100s \$
AD594/AD595					TC	X			L	6.00/6.00
AD596/AD597					TC	X			L	7.00/7.00
AD693	X	X		X	mV: All	X			L	9.00
1B21	X		X					X	L	45.00
1B22		X	X					X	PL	52.00
1B31				X	Strain Gage		X		L	45.00
1B32				X	Strain Gage		X		L	52.00
1B41			X	X	RTD			X	PL	58.00
1B51			X		TC, mV			X	PL	52.00
2B20		X						X	L	32.00
2B22		X	X					X	L	85.00
2B23		X	X					X	L	80.00
2B24	X		X					X	L	108.00
2B30					Strain Gage, RTD			X	L	46.00
2B31				X	Strain Gage, RTD			X	L	58.00
2B50			X		TC, mV			X	L	93.00
2B52	X		X		TC, mV			X	L	228.00
2B53	X				TC, mV			X	L	163.00
2B54/2B55			X		mV, 4-Channel			X	L	170.00/166.00
2B57	X			X	Solid State (AD590)			X	L	47.00
2B58				X	3-Wire RTD			X	L	176.00
2B59	X			X	2-Wire RTD			X	L	47.00
3B Series				Modular Signal Conditioning Subsystem, Flexible, User Configurable					L	179.00
4B Series				Alarm Limit Subsystem					L	144.00
5B Series				Modular Signal Conditioning Subsystem; System Applications					L	105.00
*6B Series				Software Configurable, Digitizing Signal Conditioning Subsystem					SF-54	140.00
*7B Series				Low Cost, Modular Process Control Signal Conditioners					SF-55	†

¹Package Options: D-Side-Brazed Dual-In-Line Ceramic; E-Leadless Chip Carrier; F-Flat Pack; H-Round Hermetic Metal Can (Header); N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC); Q-Cerdip; R-Small Outline Plastic (SOIC); Y-Single In-Line Package.

²Temperature Ranges: C-Commercial, 0 to +70°C; I-Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M-Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

Digital Panel Instruments

Digital Panel Meters

Model	Digits	FS Range	Data Output	Display Type	Page	Comments	Price 100s \$
AD2026-1	3	-99mV to +999mV	N/A	LED	L	+5V Power	49.00
AD2010	3 1/2	±199.9mV	BCD	LED	L	+5V Power	238.00
AD2021	3 1/2	±199.9mV, ±1.999V, ±19.99V	Serial	LED	L	+5V Power	163.00
AD2026-2	3	-99mV to +999mV	N/A	LED	L	Line Power	93.00

Digital Temperature/Transducer Meters

Model	Interface	Readout	Digital Data Output	Page	Comments	Price 100s \$
AD2050	Thermocouple	LED 3 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, User Specified Thermocouple	165.00
AD2051	Thermocouple	LED 3 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, Switch Selected Thermocouple	192.00
AD2060	RTD/Thermister	LED 3 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, User Specified RTD/Thermister	190.00
AD2061	RTD/Thermister	LED 3 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, Switch Selected RTD/Thermister	216.00
AD2070	Thermocouple	LED 4 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, Autoranging Thermocouple	265.00
AD2071	Thermocouple	LED 4 1/2 Digits	7-Bit Character Serial ASCII	L	Self-Calibrated, Autoranging Thermocouple	295.00

Digital Signal Processing Components

Fixed Point Multipliers

Word Size	Model	Multiplication Time, ns ¹				I _{DD} ²		Twos Comp	Data Formats	Mixed Mode	Pins	Package Options ³	Logic Type	Page	Price 100s \$
		Clocked	Unclocked		Unsign Mag.										
8×8	ADSP-1080A	J=45 K=33	S=55 T=45	N/A	N/A	45	55	X			40	D, E ⁴ , N	TTL	D	22.00
8×8	ADSP-1081A	J=45 K=33	S=55 T=45	N/A	N/A	45	55		X		40	D, E ⁴ , N	TTL	D	25.00
12×12	ADSP-1012A	J=75 K=50	S=90 T=60	J=105 K=80	S=125 T=95	60	70	X	X	X	64 68	D, N E, G	TTL	D	23.00
16×16	ADSP-1016A	J=85 K=70	S=95 T=80	J=105 K=90	S=120 T=105	65	55	X	X	X	64 68	D, N E, G	TTL	D	21.00
24×24	ADSP-1024A	J=120 K=95	S=150 T=120	N/A	N/A	75	90	X			84	G	TTL ⁵	D	81.00

Multiplier/Accumulators

Word Size	Model	Multiplication Accumulate Time ¹		Accum Size	# of Accum	I _{DD} ²		Pins	Package Options ³	Page	Price 100s \$
		Comm	MIL			Comm	MIL				
8×8	ADSP-1008A	J=60 K=50	S=75 T=60	19	1	40	45	48	D, N	D	30.00
12×12	ADSP-1009A	J=85 K=70	S=100 T=85	27	1	70	75	64 68	D, N E, G	D	30.00
16×16	ADSP-1010B	J=55 K=45	S=65 T=55	35	1	110	125	64 68	D E ⁴ , G, P	D	18.00
16×16	ADSP-1101	J=90 K=80	S=105 T=95	40	2	75	75	100	G	D	105.00
16×16	ADSP-1110A	J=100 K=85	S=120 T=100	40	1	70	80	28	D, E, N, P	D	37.00

¹ns max @ T_A = +70°C Commercial, T_A = +125°C Military.

²mA max, f_{CLK} = max, V_{DD} = +5 V @ T_A = +70°C Commercial, +125°C Military.

³Package Options: D-Side-Brazed Dual-In Ceramic; E-Leadless Chip Carrier; G-Pin Grid Array; N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC).

⁴Contact factory.

⁵TTL levels of 0.8 V and +2.2 V.

Boldface Type: Product recommended for new design.

Digital Signal Processing Components

Floating Point Components

Part	Grade	Number of Ports	Pipelined Throughput (ns)		Latency (ns)		IEEE Exact Divide (μs)		IEEE Exact Square Root (μs)		Page	Price 100s \$
			32-Bit	64-Bit	32-Bit	64-Bit	32-Bit	64-Bit	32-Bit	64-Bit		
ADSP-3211 Multiplier	L	3	50	200	140	315					D	300.00
	K	3	100	400	240	590						
	J	3	125	500	300	738						
	U	3	70	280	190	400						
	T	3	125	500	300	738						
	S	3	150	600	360	885						
ADSP-3210 Multiplier	L	2	60	240	190	370					D	300.00
	K	2	100	400	290	590						
	J	2	125	500	363	738						
	U	2	75	300	238	463						
	T	2	125	500	363	738						
	S	2	150	600	435	885						
ADSP-3221 ALU	K	3	100	100	240	290	1.6	3	2.9	5.8	D	300.00
	J	3	125	125	300	363	2	3.75	3.63	7.25		
	T	3	125	125	300	363	2	3.75	3.63	7.25		
	S	3	150	150	360	435	2.4	4.5	4.35	8.7		
ADSP-3220 ALU	K	3	100	100	240	290					D	300.00
	J	3	125	125	300	363						
	T	3	125	125	300	363						
	S	3	150	150	360	435						
ADSP-3201 Multiplier	K	3	100		240						D	97.00
	J	3	125		300							
	T	3	125		300							
	S	3	150		360							
ADSP-3202 ALU	K	3	100		240		1.6		2.9		D	97.00
	J	3	125		300		2		3.63			
	T	3	125		300		2		3.63			
	S	3	150		360		2.4		4.35			
ADSP-3212 Multiplier/ Divider	K	3	50	50	130	155	0.300	0.600			D	297.00
	J	3	60	60	157	187	0.36	0.72				
ADSP-3222 ALU	K	3	50	50	130	155	0.8	1.5	1.45	2.90	D	297.00
	J	3	60	60	157	187	0.96	1.8	1.74	3.48		

Microcoded Support Components

ADSP-1401 PROGRAM SEQUENCER

		Program Address Size	Clock-to- Address Valid Delay ¹	Minimum Cycle Time	Stack Depth	Number of Interrupts	I _{DD} ²	Package Options ³	Logic Type	Page	Price 100s \$
Commercial	J	16 Bits / 64 K Words	35 ns	90 ns	64 Words	10	75 mA	D, N, P	TTL	D	52.00
	K	16 Bits / 64 K Words	25 ns	70 ns	64 Words	10	75 mA	D, N, P	TTL	D	
Military	S	16 Bits / 64 K Words	45 ns	110 ns	64 Words	10	100 mA	D	TTL	D	
	T	16 Bits / 64 K Words	35 ns	90 ns	64 Words	10	100 mA	D	TTL	D	

ADSP-1402 PROGRAM SEQUENCER

		Program Address Size	Clock-to- Address Valid Delay ¹	Minimum Cycle Time	Stack Depth	Number of Interrupts	Event Counters	Package Options ³	Logic Type	Page	Price 100s \$
Commercial	J	16 Bits / 64 K Words	15 ns	65 ns	64 Words	10	4	G	TTL	D	68.00
	K	16 Bits / 64 K Words	25 ns	70 ns	64 Words	10	4	G	TTL	D	88.00

¹Maximum at +70°C for Commercial, +125°C for Military.

²mA maximum, $f_{CLK} = \max$, over full V_{DD} range, at +70°C for Commercial, +125°C for Military.

³Package Options: D-Side-Brazed Dual-In-Line Ceramic; G-Pin Grid Array; N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC)

Boldface Type: Product recommended for new design.

Digital Signal Processing Components

Microcoded Support Components

ADSP-1410 ADDRESS GENERATOR

				Clock-to-Address	Minimum	# of Address	Total # of		Package	Logic		Price
		Data Memory	Address Size	Valid Delay ¹	Cycle Time	Registers	Registers	I _{DD} ²	Options ³	Type	Page	100s \$
		Single-Precision	Double-Precision									
Commercial	J	16 Bits / 64 K Words	30 Bits / 1 Gigaword	35 ns	100 ns	16	30	75 mA	D, N, P	TTL	D	33.00
	K	16 Bits / 64 K Words	30 Bits / 1 Gigaword	30 ns	90 ns	16	30	75 mA	D, N, P	TTL	D	
Military	S	16 Bits / 64 K Words	30 Bits / 1 Gigaword	45 ns	125 ns	16	30	100 mA	D	TTL	D	
	T	16 Bits / 64 K Words	30 Bits / 1 Gigaword	35 ns	100 ns	16	30	100 mA	D	TTL	D	

ADSP-3128A REGISTER FILE

Model	Word Size Bits	Cycle Rate ns	# of 16 Bit Ports	Bandwidth Bits/μs	# of Transfer Cycles	Bidirectional Port	Technology	Package Options ³	Comments	Page	Price 100s \$
ADSP-3128A	128 × 16 or 64 × 32	50	5	3,200	5	1	CMOS	G	Cascadable	D	145.00

Microprocessors and Development Tools

ADSP-2100 / ADSP-2100A / ADSP-2101

Model	Cycle Time (ns)	Speeds (MHz)	Temperature Ranges	Package Options ³	Page	Price 1000s \$
ADSP-2100	166	6.144	0 to +70°C	P, G, Z	D	60.00
	125	8.192	-55°C to +125°C			
ADSP-2100A	100	10.24	0 to +70°C	P, G, Z	D	76.00
	80	12.50	-55°C to +125°C			
ADSP-2101	100	10.24	0 to +70°C	P, G	D	54.00
	80	12.50	-55°C to +125°C			

ADSP-2100/ADSP-2100A/ADSP-2101 DEVELOPMENT TOOLS

Model	Description	Price Single Piece \$
ADDS-210XSW-PC	C Compiler, Cross-Software and Simulator (IBM PC/DOS [†])	1950.00
ADDS-2110	Cross-Software and Simulator (VAX/VMS)	2850.00
ADDS-2121	Cross-Software (IBM PC/DOS)	225.00
ADDS-2122	Simulator (IBM PC/DOS)	225.00
ADDS-2123-C	Cross-Software and Simulator (Sun 2/3/Unix BSD 4.2)	1995.00
ADDS-2130	C Compiler, Cross-Software and Simulator (VAX/VMS)	4350.00
ADDS-2131	C Compiler, Cross-Software and Simulator (IBM PC/DOS)	1950.00
ADDS-2133-C	C Compiler, Cross-Software and Simulator (Sun 2/3/Unix BSD 4.2)	2990.00
ADDS-2150A-8	ADSP-2100A In-Circuit Emulator (110 V)	8450.00
ADDS-2150AE-8	ADSP-2100A In-Circuit Emulator (220 V)	8450.00
ADDS-2160-8	ADSP-2100A Evaluation Board	1950.00
ADDS-2190	Three-Day ADSP-2100 Workshop	975.00
ADDS-2169	University Package (ADDS-2131 and ADDS-2160)	1495.00

¹Maximum at +70°C for Commercial, +125°C for Military.

²mA maximum, $f_{CLK} = \max$, over full V_{DD} range, at +70°C for Commercial, +125°C for Military.

³Package Options: D-Side-Brazed Dual-In-Line Ceramic; G-Pin Grid Array; N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC); Z-Ceramic Quad Flat Pack. Boldface Type: Product recommended for new design.

[†]IBM PC/DOS is a trademark of International Business Machines Corporation.

Data Acquisition Subsystems

Model	Resolution Bits	Throughput Rate kHz	No. Channels	Bus Interface	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD1332	12	125	1	12	D	I	C	Complete 12-Bit 125 kHz Sampling ADC	142.80
AD1330	12	100	1	12	D	C	C	18-Bit Floating Point DAS	310.00
AD1334	12	65	4	12	D	I	C	Four-Channel 12-Bit Sampling ADC	180.00
AD368	12	50	1	12	D	I, M	C	Complete 12-Bit ADC with Programmable Gains of 1, 8, 64, 512	99.95
AD369	12	50	1	12	M	I	C	Complete 12-Bit ADC with Programmable Gains of 1, 10, 100, 500	109.15
AD364R	12	50	16/8	12	D	C, M	C	High Speed 16-Channel 12-Bit DAS	262.15
AD363R	12	40	16/8	12	D	C, M	C	16-Channel 12-Bit DAS	163.20
AD1362			16/8		D	C, M	C	16-Channel Analog Front-End for 12-Bit ADC	148.60
DAS1152	14	25	1	14	D	I	C	14-Bit High Accuracy Sampling ADC	209.00
DAS1157	14	18	1	14	D	I	C	Low Power 14-Bit Sampling ADC	219.00
DAS1153	15	25	1	15	D	I	C	15-Bit High Accuracy Sampling ADC	261.00
DAS1158	15	18	1	15	D	I	C	Low-Power 16-Bit Sampling ADC	263.00
AD367	15		1	Serial	M	C	C	Integrating ADC with Programmable Gain Amplifier	110.30
DAS1159	16	18	1	16	D	I	C	Low Power 16-Bit Sampling ADC	289.00

¹Package Options: D—Side-Brazed Dual-In-Line Ceramic; M—Metal Hermetic Dual-In-Line.

²Temperature Ranges: C—Commercial, 0 to +70°C; I—Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M—Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

Complete 12-Bit Sampling A/D Converter for Digital Signal Processing

AD1362/AD363R/AD364R

AD1362

16-Channel Data Acquisition Input Stage with:
Digitally Controlled Channel Selection/Mode
Control

16 Single-Ended or 8 Differential Channels
High Common-Mode Rejection
10 μ s Acquisition Time to 12-Bit
Accuracy (0.01%)

AD363R

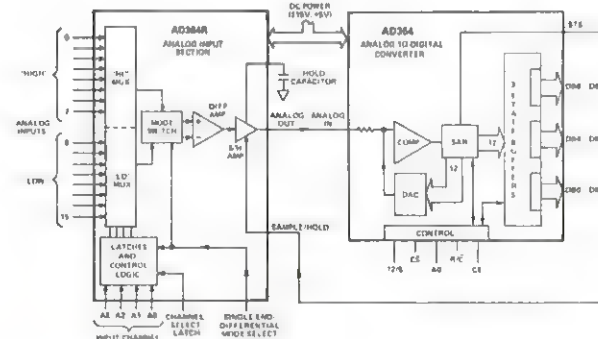
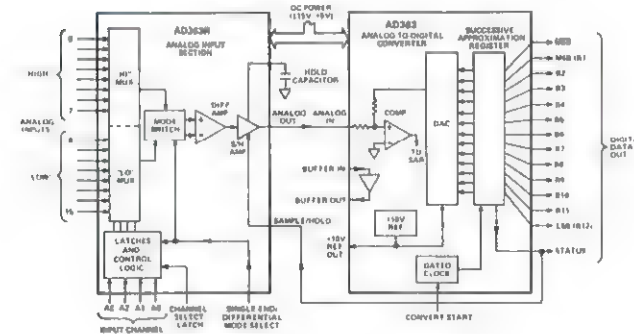
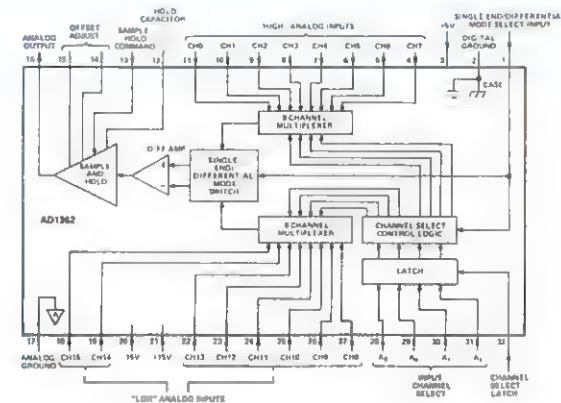
16-Channel Data Acquisition Input Stage with:
Digitally Controlled Channel Selection/Mode
Control

16 Single-Ended or 8 Differential Channels
25 kHz Throughput Rate
Guaranteed No Missing Codes Over
Temperature

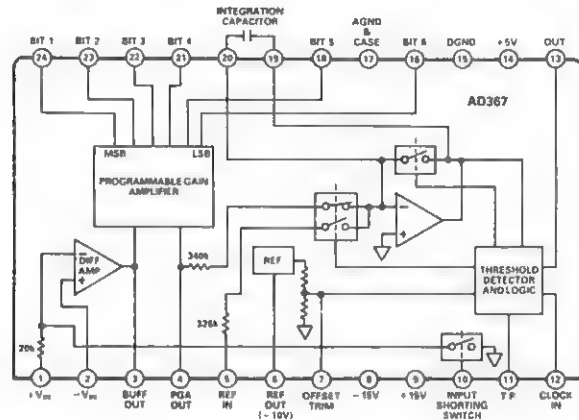
AD364R

16-Channel Data Acquisition Input Stage with:
Digitally Controlled Channel Selection/Mode
Control

16 Single-Ended or 8 Differential Channels
20 kHz Throughput Rate
Guaranteed No Missing Codes Over
Temperature
Three-State Buffered Digital Output



High Resolution Programmable Gain DAS



AD367

Differential Input – Programmable Gain Amplifier

6-Bit (1 or 64) Gain Control

Internal – 10 V Reference

15-Bit Integral Nonlinearity

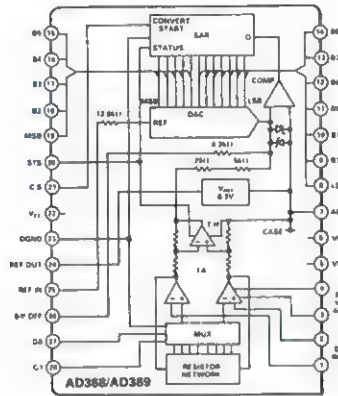
±305 μ V Resolution

10 ms Conversion Time

External Integration Capacitor

Programmable Conversion Time

Complete 12-Bit A/D Converter with Programmable Gain



AD368/AD369

Low Cost Data Acquisition Systems Including:

Programmable Gain Instrumentation

Amplifier

Track-and-Hold Amplifier

12-Bit A/D Converter

Digitally Controlled Gains:

AD368 Gains = 1, 8, 64, 512

AD369 Gains=1, 10, 100, 500

50 kHz Throughput Rate

Small Size: 28-Pin Hermetic Double DIP

Guaranteed No Missing Codes Over

Specified Temperature

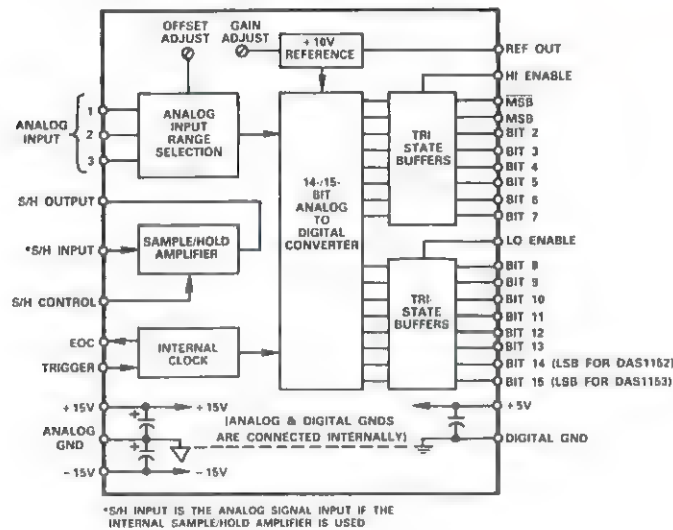
True 12-Bit Linear; Error $\leq 1/2$ LSB (B Grade)

Unipolar or Bipolar Operation

Data Acquisition Subsystems

Low Power, Sampling A/D Converters

14-Bit & 15-Bit Sampling A/D Converter



DAS1152/DAS1153

Complete with High Accuracy Sample/Hold and A/D Converter

Differential Nonlinearity: $\pm 0.002\%$ FSR max (DAS1153)

Nonlinearity: DAS1152: $\pm 0.005\%$ FSR max
DAS1153: $\pm 0.003\%$ FSR max

Low Differential Nonlinearity T.C.: ± 2 ppm/ $^{\circ}$ C max

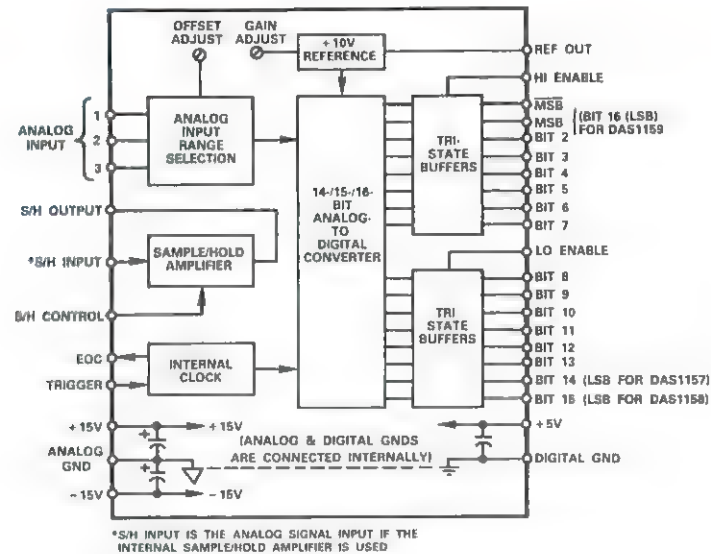
High Throughput Rate: 25 kHz min (DAS1152)

High Feedthrough Rejection: -96 dB

Byte-Selectable Tristate Buffered Outputs

Internal Gain & Offset Potentiometers

Improved Second Source to A/D/A/M 824 and A/D/A/M 825 Modules



DAS1157/DAS1158/DAS1159

Complete with High Accuracy Sample/Hold and A/D Converter

Low Power Consumption: 650 mW max, $V_S = \pm 15V$

Rated Performance: -25°C to $+85^{\circ}\text{C}$

Low Nonlinearity (DAS1158 and DAS1159)

Differential: $\pm 0.0015\%$ FSR max

Integral: $\pm 0.003\%$ FSR max

Differential T.C.: ± 1 ppm/ $^{\circ}$ C max

High Throughput Rate: 18 kHz min

Byte-Selectable Tristate Buffered Outputs

Internal Gain & Offset Potentiometers

All Hermetically Sealed Semiconductors

Complete Analog I/O Ports

Model	Resolution Bits	Conv Time max μ s	SHA BW kHz typ	Settling Time μ s	Ref. Volt Int/Ext	Bus Interface	Package Options ¹	Temp Range ²	Page	Comments	Price 100s \$
AD7569	8	2	200	1	Int	8, μ P	E, N, P, Q	C, I, M	C	CMOS, Complete I/O Port with DAC, ADC, SHA, Amps and Reference	6.00
AD7669	8	2	200	1	Int	8, μ P	N, P	C, I, M	C	CMOS, Complete I/O Port with 2 DACs, ADC, SHA, Amps, and Reference	9.50
*AD7769	8	3	200	2.5	Ext	8, μ P	N, P	C	SF-43	CMOS, Two-Channel ADC/DAC with Output Amplifiers	10.00
*AD7770	8	2.5	100	10	Ext.	8, μ P	N, P	C	SF-43	CMOS, I/O Port with 6 Channel 8-Bit ADC and 12-Bit DAC	†
*AD7868	12	8	50	3	Int (+3 V)	Serial, μ P	Q	C, I, M	SF-43	CMOS, Complete I/O Port with 12-Bit ADC and 12-Bit DAC	35.00

¹Package Options: E-Leadless Chip Carrier; N-Plastic Molded Dual-In-Line; P-Plastic Leaded Chip Carrier (PLCC); Q-Cerdip.

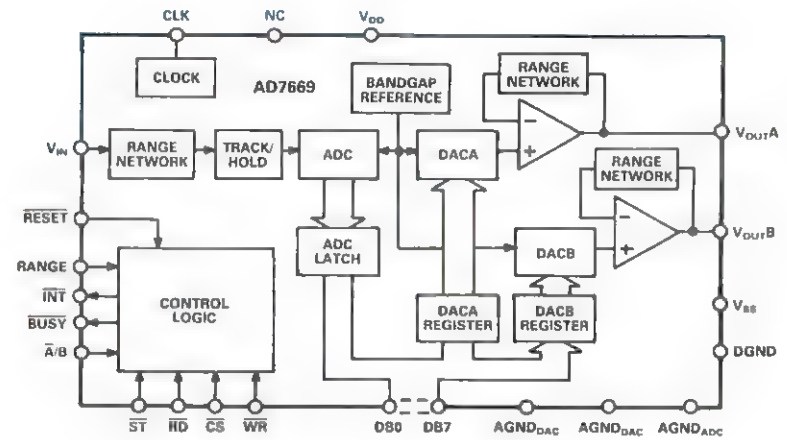
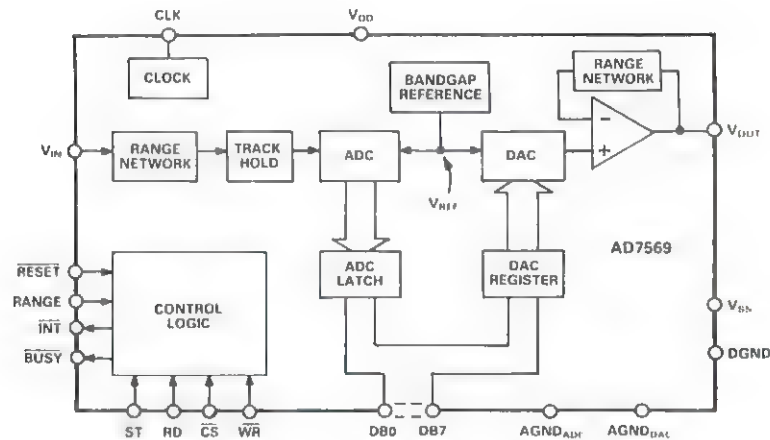
²Temperature Ranges: C-Commercial, 0 to +70°C; I-Industrial, -40°C to +85°C (Some older products -25°C to +85°C); M-Military, -55°C to +125°C.

Boldface Type: Product recommended for new design.

*New product since the publication of the most recent Databooks.

†Consult factory for price.

LC²MOS Complete, 8-Bit Analog I/O System



AD7569/AD7669

2 μ s ADC with Track/Hold

1 μ s DAC with Output Amplifier

AD7569, Single DAC Output

AD7669, Dual DAC Output

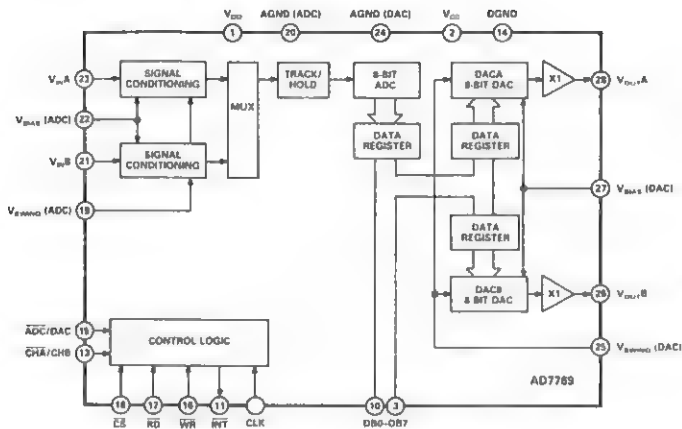
On-Chip Bandgap Reference

Fast Bus Interface

Single or Dual 5 V Supplies

Additional Information:

LC²MOS Analog I/O Port



AD7769

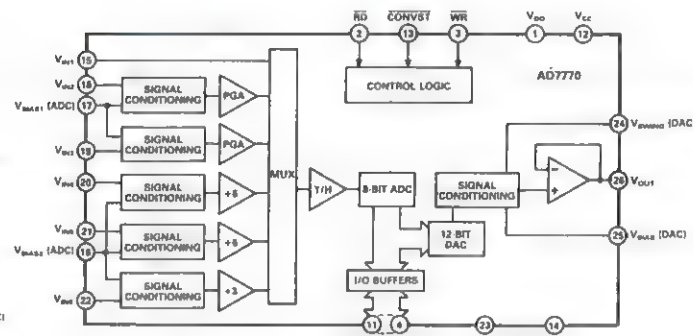
FEATURES

- Two-Channel, 8-Bit 2.5 μ s ADC
- Two 8-Bit, 2.5 μ s DACs with Output Amplifiers
- Span and Offset of ADC and DAC Independently Adjustable
- Low Power

APPLICATIONS

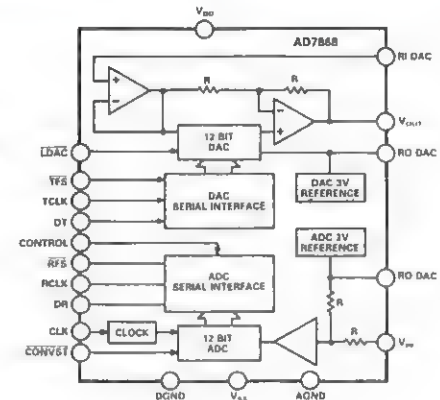
- Winchester Disk Servo Controllers
- Floppy Disk Microstepping
- Closed Loop Servo Systems

LC²MOS Analog I/O Port LC²MOS Complete 12-Bit Analog I/O System



AD7770

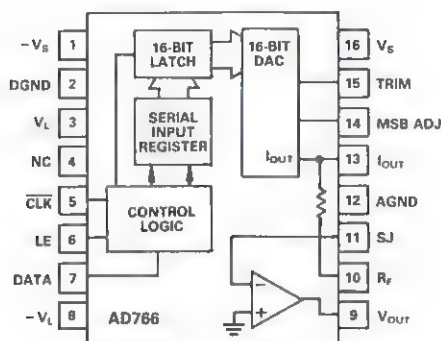
- 12-Bit, 10 μ s DAC with Output Amplifier
- Six-Channel, 8-Bit, 2.5 μ s ADC
- Programmable Gain Control on Two Input Channels
- Adjustable Bias Voltage for Five Input Channels
- Adjustable Span and Bias Voltage for Output Channel



AD7868

- Complete 12-Bit I/O System, Comprising:
 - 12-Bit ADC with Track/Hold Amplifier
 - 100 kHz Throughput Rate
 - 72 dB SNR
 - 12-Bit DAC with Output Amplifier
 - 3 μ s Settling Time
 - 72 dB SNR
- Operates from ± 5 V Supplies
- Low Power – 130 mW typ
- Small 0.3" Wide DIP

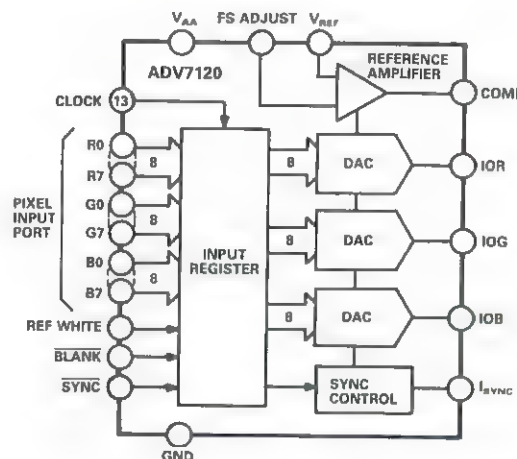
16-Bit Zero-Chip Interface DAC



AD766

Zero-Chip Interface to Popular μ P, μ C and DSPs
Specified over Commercial and Military
Temperature Ranges
0.0025% THD
Fast Settling Permits 2 \times , 4 \times or 8 \times Oversampling
 ± 3 V Output
Optional Trim Allows Superlinear Performance
 ± 5 V to ± 12 V Operation
16-Pin Plastic and Hermetic DIP Packages
Serial Input

CMOS 80 MHz Triple 8-Bit Video DAC



ADV7120

FEATURES

80 MHz Pipelined Operation
Triple 8-Bit D/A Converters
RS-343A/RS-170 Compatible Outputs
TTL Compatible Inputs
+5 V CMOS Monolithic Construction
40-Pin DIP or Small 44-Pin PLCC Package
Power Dissipation: 600 mW

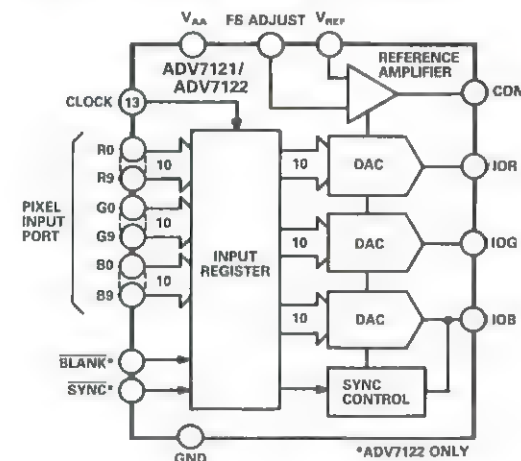
APPLICATIONS

High Resolution Color Graphics
CAE/CAD/CAM Applications
Image Processing
Instrumentation
Video Signal Reconstruction
Desktop Publishing

SPEED GRADES

80 MHz
50 MHz
30 MHz

CMOS 80 MHz Triple 10-Bit HDTV Video DACs



ADV7121/ADV7122

FEATURES

80 MHz Pipelined Operation
Triple 10-Bit D/A Converters
RS-343A/RS-170 Compatible Outputs
TTL Compatible Inputs
+5 V CMOS Monolithic Construction
44-Pin PLCC Package
Power Dissipation: 600 mW

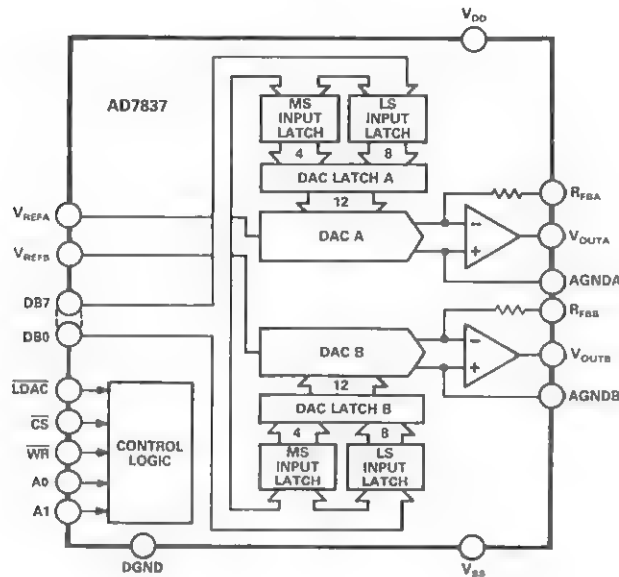
APPLICATIONS

High Definition Television (HDTV)
High Resolution Color Graphics
CAE/CAD/CAM Applications
Image Processing
Instrumentation
Video Signal Reconstruction
Desktop Publishing

SPEED GRADES

80 MHz
50 MHz
30 MHz

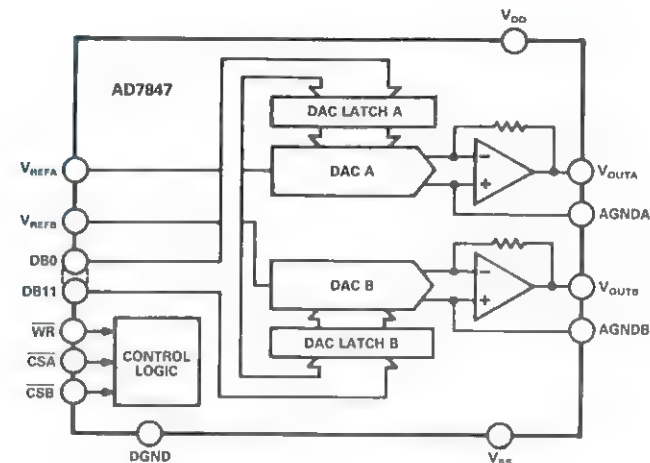
LC²MOS Complete Dual 12-Bit MDAC



AD7837

Two Complete 12-Bit MDACs
On-Chip Output Amplifiers
5 μ s Settling Time
4-Quadrant Multiplication
Space-Saving 0.3", 24-Pin DIP and
28-Terminal PLCC Packages
(8+4) Loading Structure

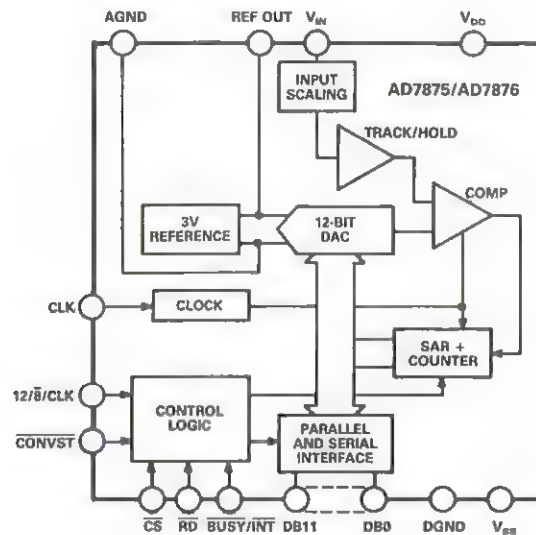
LC²MOS Complete Dual 12-Bit MDAC



AD7847

Two Complete 12-Bit MDACs
On-Chip Output Amplifiers
5 μ s Settling Time
4-Quadrant Multiplication
Space-Saving 0.3", 24-Pin DIP and
28-Terminal PLCC Packages
12-Bit Parallel Loading Structure

LC²MOS Complete 12-Bit, 100 kHz Sampling ADCs



AD7875/AD7876

Complete Monolithic 12-Bit ADC with:

2 μ s Track/Hold Amplifier

8 μ s A/D Converter

On-Chip Reference

Laser-Trimmed Clock

Parallel, Byte and Serial Digital Interface

72 dB SNR at 10 kHz Input Frequency
(AD7875)

57 ns Data Access Time

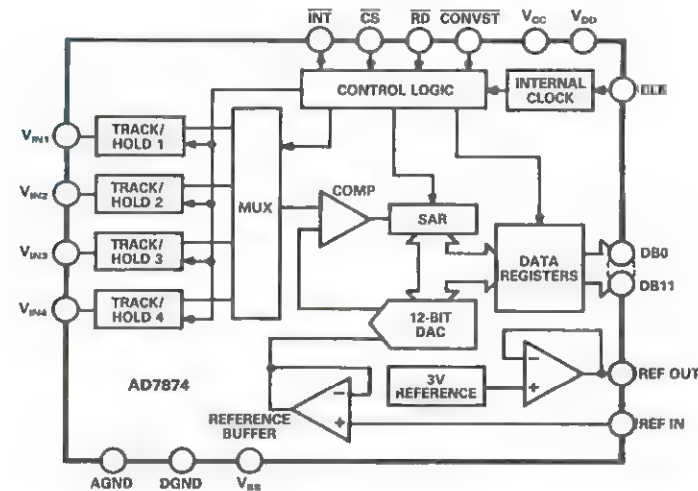
Low Power –60 mW Typical

Variety of Input Ranges:

0 to +5 V for AD7875

± 10 V for AD7876

LC²MOS Complete 4-Channel 12-Bit Simultaneous Sampling Data Acquisition System



AD7874

Four On-Chip Track/Hold Amplifiers

Simultaneous Sampling of 4 Channels

Matching Aperture Delay Specification

Fast 12-Bit ADC (7.5 μ s Conversion

Time/Channel)

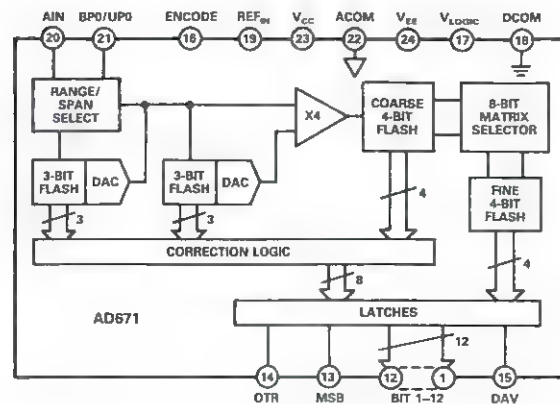
30 kHz Sample Rate for All Four Channels

Internal/External Reference Option

± 10 V Input Range

± 5 V Supplies

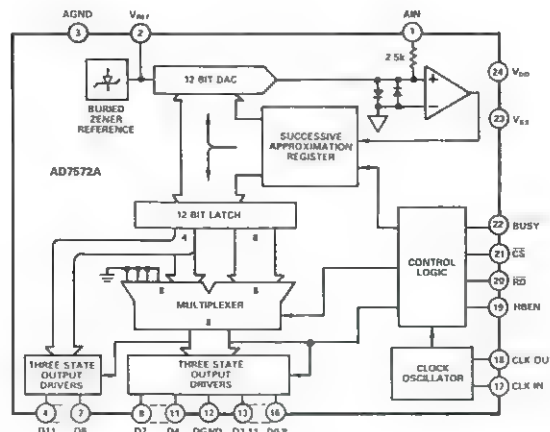
Monolithic 12-Bit 2 MHz A/D Converter



AD671

12-Bit Linearity
24-Pin "Skinny DIP" Package
500 ns Maximum Conversion Rate
Low Power: 500 mW Maximum
Unipolar and Bipolar Input Ranges

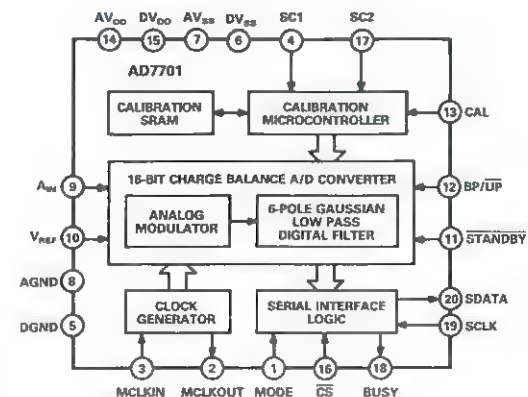
LC²MOS Complete High Speed 12-Bit ADC



AD7572A

Improved AD7572
Faster Conversion Time
AD7572AXX03: 3 μ s
AD7572AXX10: 10 μ s
-12 V or -15 V Power Supply Operation
Better Offset and Gain Error Specifications
Extended Plastic Temperature Range
(-40°C to +85°C)
Low Power: 100 mW
Small 24-Pin, 0.3" Wide DIP and
SOIC DIP Packages

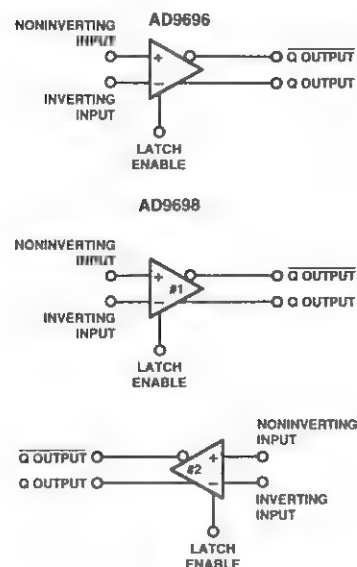
LC²MOS 16-Bit Charge Balancing ADC



AD7701

Monolithic 16-Bit Charge Balancing ADC
0.0015% Linearity Error
On-Chip Self-Calibration Circuitry
Programmable Low Pass Filter
0.1 Hz to 10 Hz Corner Frequency
0 to +2.5 V or \pm 2.5 V Analog Input Range
4 KSPS Output Data Rate
Flexible Serial Interface
Ultralow Power

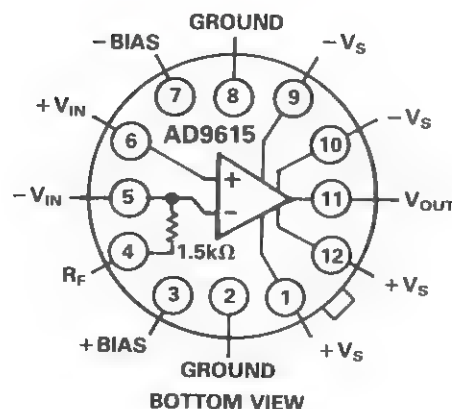
Ultrafast TTL-Compatible Voltage Comparators



AD9696/AD9698

4.5 ns Propagation Delay
200 ps Maximum Prop Delay Dispersion
Single +5 V or ± 5 V Supply Operation
Complementary Matched TTL Outputs

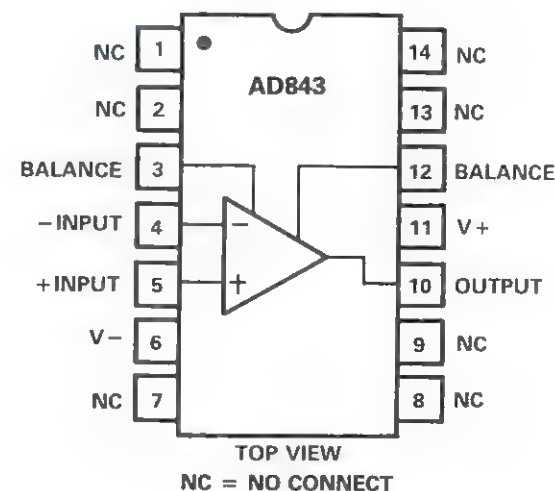
Ultrafast, Precision Operational Amplifier



AD9615

Low Distortion
Small Signal Bandwidth 200 MHz
Full Power Bandwidth 190 MHz
Settling: 13 ns to 0.1%
Offset Voltage ± 0.25 mV; $3 \mu\text{V}/^\circ\text{C}$
Bias Current ± 500 nA; $20 \text{ nA}/^\circ\text{C}$
Power Dissipation Independent of Load

35 MHz, CBFET Fast Settling Op Amp



AD843

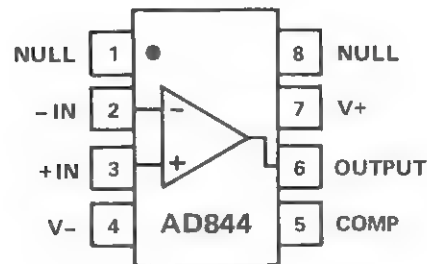
AC PERFORMANCE

Unity Gain Bandwidth: 35 MHz
Fast Settling: 130 ns to 0.01%
Slew Rate: 300 V/ μs
Unity Gain Stable
Full Power Bandwidth: 4.8 MHz

DC PERFORMANCE

Input Offset Voltage: 1 mV Maximum
Input Bias Current: 120 pA Typical
Input Voltage Noise: 13 nV/ $\sqrt{\text{Hz}}$
Open Loop Gain: 50 V/mV into a 500 Ω Load
Output Current: 50 mA Minimum
Supply Current: 12 mA Maximum

2000 V/ μ s Slew Rate Operational Amplifier



AD844

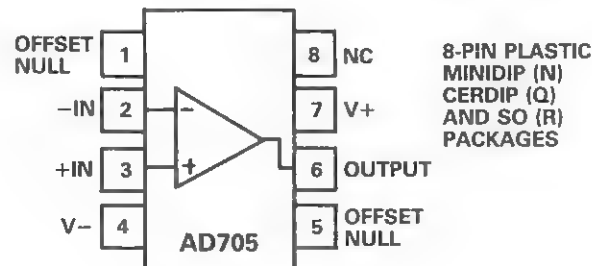
AC PERFORMANCE

Fast Settling: 100 ns to 0.1% (10 V Step)
 Small Signal Bandwidth: 60 MHz (Gain = -1)
 40 MHz (Gain = -10)
 Slew Rate: 2000 V/ μ s
 Full Power Bandwidth: 20 MHz (V_O = 20 V p-p)
 Constant Rise Time over Input Amplitude

DC PERFORMANCE

Input Offset Voltage: 200 μ V Maximum
 Input Offset Drift: 2 μ V/ $^{\circ}$ C
 Input Voltage Noise: 2 nV/ $\sqrt{\text{Hz}}$
 (100 Hz - 10 MHz)
 Open Loop Transresistance: 2.8 M Ω
 Output Current: 50 mA Minimum into 50 Ω
 Quiescent Supply Current: 6.5 mA

Picoampere I_B & I_B Drift, μ V V_{OS} Bipolar Op Amp



AD705

DC PERFORMANCE

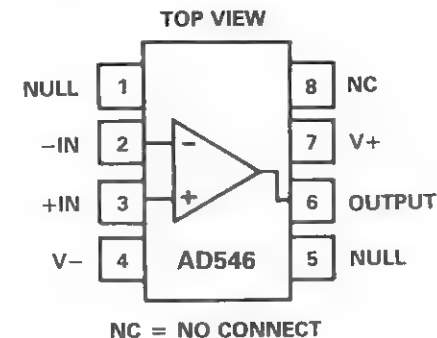
25 μ V max Offset Voltage (AD705K)
 1 μ V/ $^{\circ}$ C max Drift (AD705J)
 50 pA max Input Bias Current (AD705K)
 2.5 pA max I_B Drift (AD705J)
 110 dB min CMRR
 110 dB min PSRR
 120 V/mV min Open Loop Gain (2 k Ω Load)
 0.5 μ V p-p typ Noise, 0.1 Hz to 10 Hz

AC PERFORMANCE

0.25 V/ μ s Slew Rate
 800 kHz Unity Gain Bandwidth

Single Version: AD705, Dual Version: AD706
 Available in 8-Pin Plastic MiniDIP, TO-99 Can,
 Hermetic Cerdip and Surface Mount (SO)
 Packages
 MIL-STD-883B Processing Available

1 pA Monolithic Electrometer Operational Amplifier



AD546

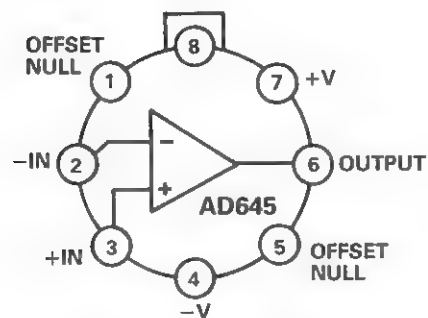
DC PERFORMANCE

1 mV max Input Offset Voltage
 Low Offset Drift: 20 μ V/ $^{\circ}$ C
 1 pA max Input Bias Current
 Input Bias Current Guaranteed over Full
 Common Mode Voltage Range

AC PERFORMANCE

3 V/ μ s Slew Rate
 1 MHz Unity Gain Bandwidth
 Low Input Voltage Noise: 4 μ V p-p,
 0.1 Hz to 10 Hz
 Available in a Low Cost, 8-Pin Plastic MiniDIP
 Standard Op Amp Pinout

Low Noise, Precision BiFET Op Amp



NOTE: CASE IS CONNECTED TO PIN #8

AD645

NOISE PERFORMANCE

6 nV/ $\sqrt{\text{Hz}}$ at 10 kHz
1.6 μV p-p, 0.1 to 10 Hz
9.5 fA/ $\sqrt{\text{Hz}}$ Current Noise 0.1 to 10 Hz

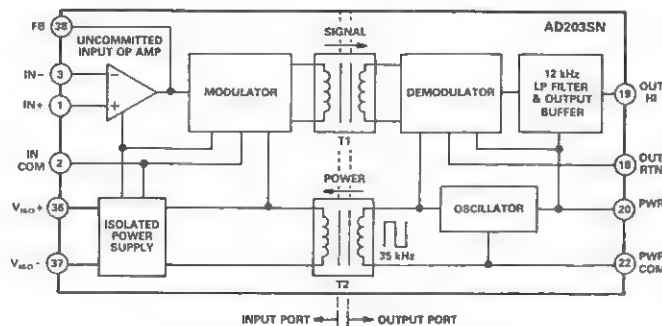
DC PERFORMANCE

250 μV max Offset Voltage (AD645K)
1 $\mu\text{V}/^\circ\text{C}$ max Drift (AD645K)
1 pA max Input Bias Current (AD645K)
Better than 114 dB (500,000 V/mV)
Minimum Open Loop Gain (All Grades)

AC PERFORMANCE

2.0 V/ μs Slew Rate
2.0 MHz Unity Gain Bandwidth

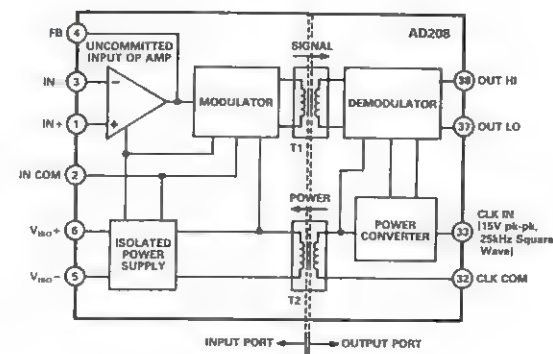
Rugged, Military Temperature Range, 10 kHz Bandwidth Isolation Amplifier



AD203

Full -55°C to $+125^\circ\text{C}$ Rated Performance
Meets MIL-STD-883C Environmental Tests
Low Nonlinearity: $\pm 0.025\%$ max
Full Power Bandwidth: 10 kHz
Isolated Power: $\pm 15\text{ V dc}$ @ $\pm 5\text{ mA}$
Wide Output Range: $\pm 10\text{ V min}$ (2.5 k Ω Load)
Gain Ranges: 1 V/V to 100 V/V
Two Port Isolation (Transformer Coupled)
Small Size: 2.23" \times 0.83" \times 0.65" DIP

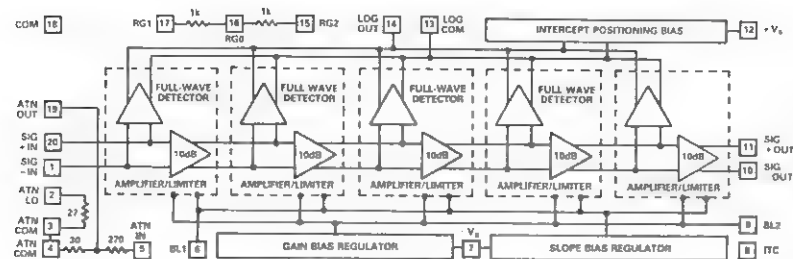
High Precision, Low Offset, mV Input Isolation Amplifier



AD208

Wide Gain Range	1 to 1,000 V/V
Low Input Offset Voltage	$\pm(0.25 + 15/G)\text{ mV max}$
Ultralow Offset Drift	$\pm(1.5 + 20/G)\text{ } \mu\text{V}/^\circ\text{C max}$
High CMV Isolation	1.5 kV rms
Isolated Power	$\pm 8.0\text{ V dc}$ @ $\pm 2.0\text{ mA}$
Small SIP Package	2.08" \times 0.26" \times 0.625" max
Pin-for-Pin Compatible with the AD204 SIP	
Two-Port, Transformer-Coupled Isolation	

DC-Coupled Demodulating Logarithmic Amplifier



AD640

Complete, Fully Calibrated Monolithic System

Five 10 dB Stages, DC-120 MHz Bandwidth

Stable Logarithmic Intercept and Slope vs.

Temperature and Supply Variations

Very Low Input Offset Voltage (25 μ V Typical)

Dual-Polarity Current Outputs of 1 mA/Decade

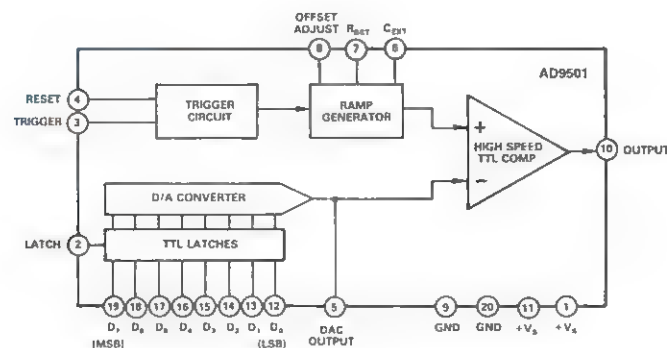
Voltage Slope Options Using On-Chip

Application Resistors

Low Power Operation (Typically 200 mW

@ ± 5 V)

TTL/CMOS-Compatible Programmable Delay Generator



AD9501

Single +5 V Supply

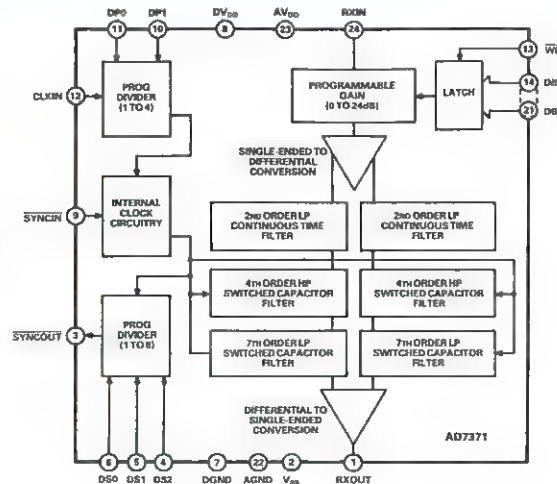
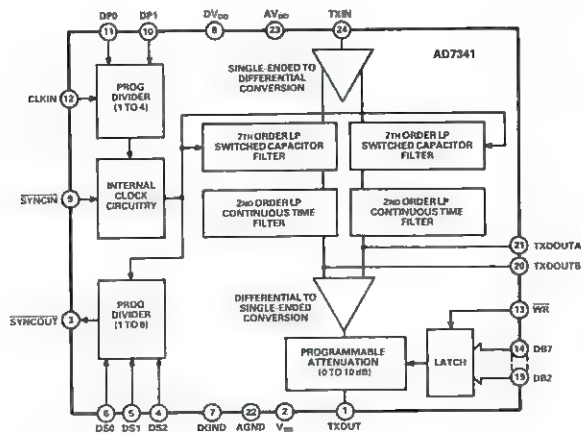
TTL and CMOS Compatible

10 ps Delay Resolution

2.5 ns to 10 μ s Full-Scale Range

Maximum Trigger Rate 50 MSPS

LC²MOS Modem Transmit & Receive Filter Set



AD7341/AD7371

AD7341 – Transmit (Reconstruction) Filter for 14-Bit DAC (AD7840)

- Programmable Attenuation Range (0 dB to –38 dB)

AD7371 – Receive Filter for 14-Bit ADC (AD7371)

- Programmable Gain Range (0 dB to 24 dB)

70 dB Stopband Attenuation

75 dB In-Band Signal-to-Noise Ratio

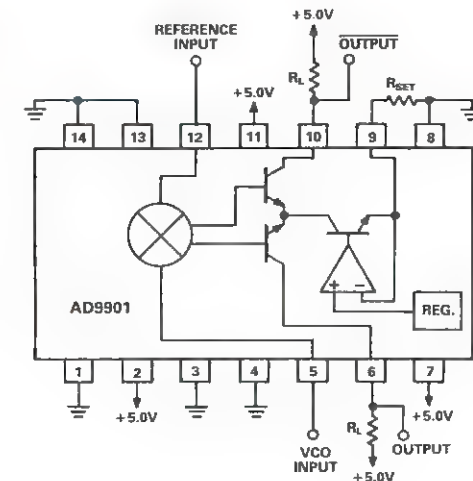
–75 dB Total Harmonic Distortion

CCITT V.32 & V.33 Compatible

Small, 0.3", 24-Pin Plastic Package & 28-Pin

PLCC Package

75 MHz Phase/Frequency Discriminator



AD9901

DC-75 MHz Input Range

ECL/TTL/CMOS Compatible

Linear Transfer Function

No "DEAD ZONE"

APPLICATIONS

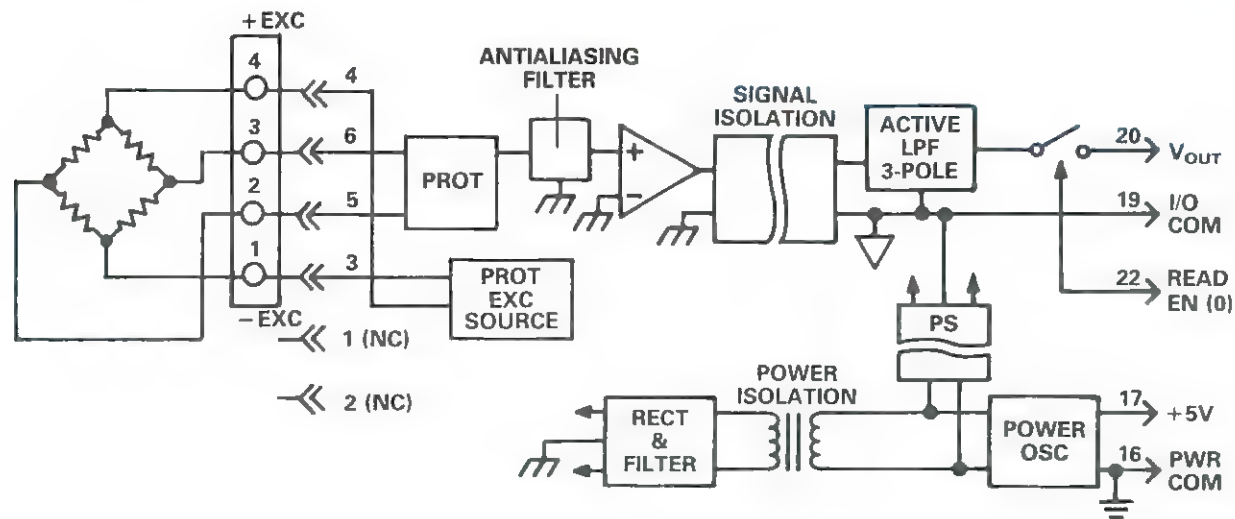
Low Phase Noise Reference Loops

Fast Tuning "Agile" IF Loops

Secure "Hopping" Communications

Coherent Radar Transmit/Receive Chains

5B38 Strain Gage Input Module



5B38

Accommodates Full and Half Bridges
Internal Half Bridge Completion
+10.0 V Excitation
Bridge Resistances from 300 Ω to 10 k Ω
10 kHz Bandwidth for Dynamic Signals

5B FAMILY FEATURES

Transformer Based Isolation: 1500 V rms
Common Mode
Small Size: 2.25" \times 2.25" \times 0.60"
No Potentiometer Adjustments
0.05% Accuracy Typical
Custom Ranging Available
Mix and Match Capability

Smart Digitizing Signal Conditioners

6B SERIES

Sensor-to-Computer Conditioning and
Digitizing, Complete Data Acquisition
System in Each Module

Inputs: Thermocouples, RTDs, Millivolt, Volt
Process Current

Output: RS-485

Backplane Option of RS-232 or RS-485

Interface to Host

Field Configuration via Software

Autocalibrating, High Performance

Integrating Converter

Linearized Outputs in Engineering Units

On-Board Microcontroller Converts Digitized
Data to Standard Units

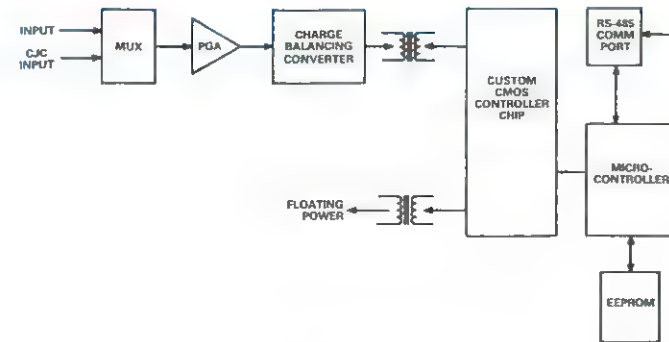
Input to Output Isolation: 1500 V rms

Designed to Meet IEEE Standard for
Transient Voltage Protection (IEEE-STD 472)

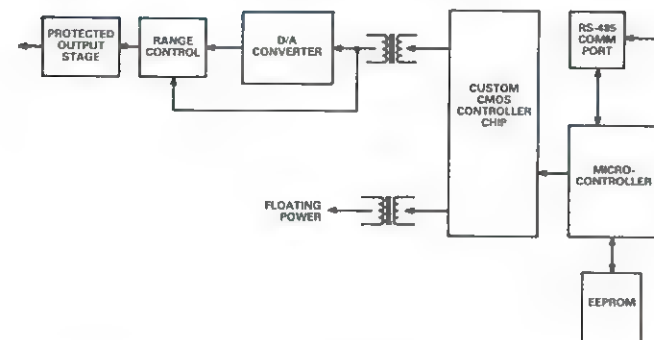
Mix and Match Module Capability

Small Package: 2.3" x 3.1" x 0.75"

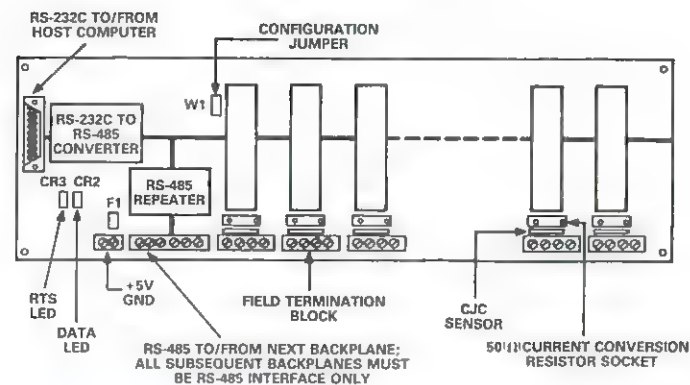
Modules Plug into Backplane for High
Channel Density



INPUT MODULE



OUTPUT MODULE



16-CHANNEL BACKPLANE

Low Cost, Modular Process Control Signal Conditioners

7B SERIES

Accepts Most Process Control Input Signals:

Thermocouples, RTDs, Millivolt, Volt and
Process Current Inputs

Input Modules Feature 1–5 Volt or 0–10 Volt
Output

Powered Current Input Provides +24 Volts for a
Transmitter

Analog Current Output Module

Complete Signal Conditioning Function:

240 V rms Field Wiring Protection, Filtering,
Amplification, 1500 V rms Transformer Based
Isolation

Pin Compatible to Industry Standard Solid State
Relays

Operate from +14 V DC to +35 V DC Power

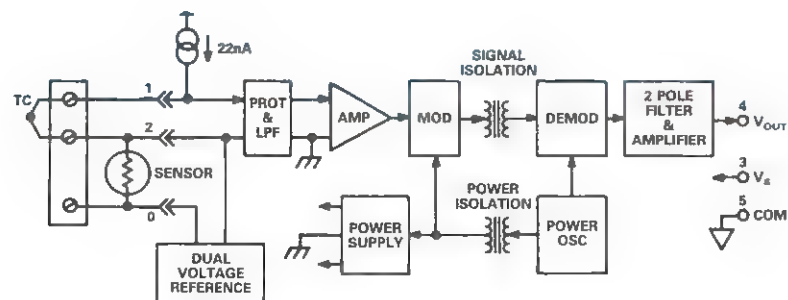
Factory Calibrated Accuracy to a Maximum of
 $\pm 0.1\%$

Mix and Match Modularity

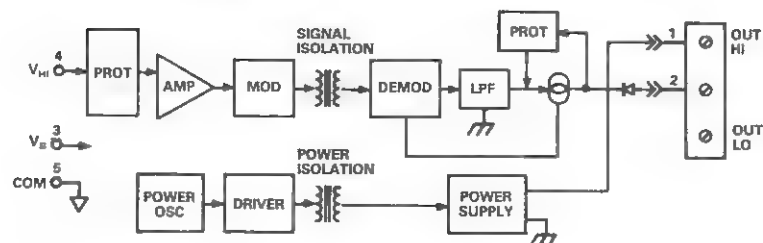
Custom Ranges Available

Small Package: 1.7" x 2.1" x 0.60"

1-, 4-, 8- and 16-Channel Backplanes

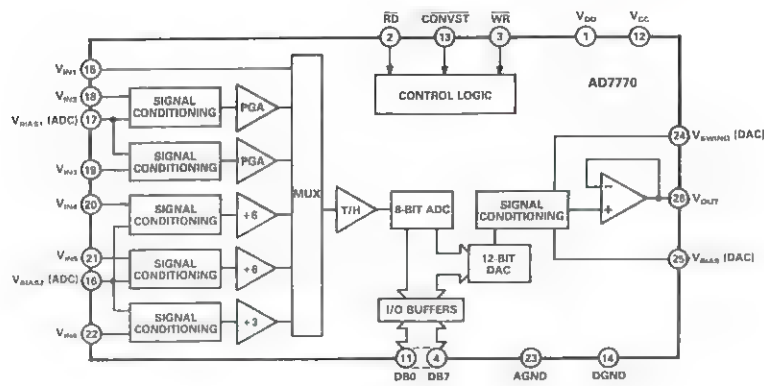


7B37 ISOLATED THERMOCOUPLE INPUT



7B39 ISOLATED CURRENT OUTPUT

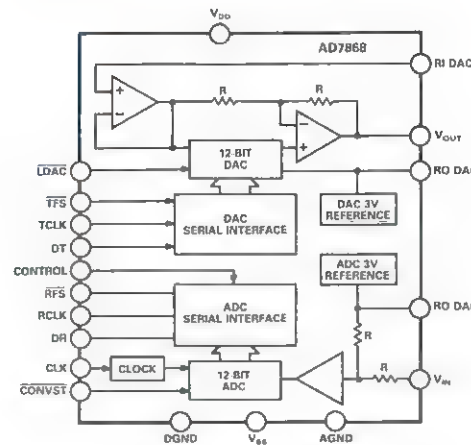
LC²MOS Analog I/O Port



AD7770

12-Bit, 10 μ s DAC with Output Amplifier
 Six-Channel, 8-Bit, 2.5 μ s ADC
 Programmable Gain Control on Two Input Channels
 Adjustable Bias Voltage for Five Input Channels
 Adjustable Span and Bias Voltage for Output Channel

LC²MOS Complete 12-Bit Analog I/O System



AD7868

Complete 12-Bit I/O System, Comprising:
 12-Bit ADC with Track/Hold Amplifier
 100 kHz Throughput Rate
 72 dB SNR
 12-Bit DAC with Output Amplifier
 3 μ s Settling Time
 72 dB SNR
 Operates from ± 5 V Supplies
 Low Power – 130 mW typ
 Small 0.3" Wide DIP

Products Available to Standard Military Drawings

Analog Devices' IC and hybrid products are supplied with processing to the three major levels of military screening, JAN QPL, Standard Military Drawing (SMD) and MIL-STD-883B (Revision C). These products are all produced in facilities which are fully qualified to MIL-M-38510 for integrated circuits, or MIL-STD-1772 for hybrids. In addition to these listings, we also publish a *Military Products Databook* which contains the specification details for designers who specify components for military contracts. The listings here are up-to-date and accurate as of the publication date (9/88), but there is ongoing development in this area by ADI and military procurement agencies. For status of specific parts, please contact your local salesperson. This list will also be updated and published every six months in *Analog Briefings* and in this *Short Form Designers' Guide*.

SMD Part Number	Generic Part Number	Description	SMD Part Number	Generic Part Number	Description
5962-8965501LX*	AD7672TQ10/883B	12-Bit High Speed ADC**	5962-8951801RX*	AD7821TQ/883B	8-Bit, 600 ns ADC with T/H**
5962-8965502LX*	AD7672UQ10/883B	12-Bit High Speed ADC**	5962-8865001RX	AD7820TQ/883B	8-Bit 2 μ s ADC with T/H
5962-8965503LX*	AD7672TQ05/883B	12-Bit High Speed ADC**	5962-88650012X	AD7820TE/883B	8-Bit 2 μ s ADC with T/H
5962-8965504LX*	AD7672UQ05/883B	12-Bit High Speed ADC**	5962-8865002RX	AD7820UQ/883B	8-Bit 2 μ s ADC with T/H
5962-8512701XA	AD574AUD/883B	Complete 12-Bit ADC**	5962-88650022X	AD7820UE/883B	8-Bit 2 μ s ADC with T/H
5962-8512702XA	AD574ATD/883B	Complete 12-Bit ADC**	5962-8876401LX*	AD7824TQ/883B	4-Channel 8-Bit ADC**
5962-8759101LX	AD7572SQ12/883B	Complete 12-Bit 12 μ s ADC**	5962-8876402LX*	AD7824UQ/883B	4-Channel 8-Bit ADC**
5962-87591013X	AD7572SE12/883B	Complete 12-Bit 12 μ s ADC**	5962-8876403XX*	AD7828TQ/883B	8-Channel 8-Bit ADC**
5962-8759102LX	AD7572TQ12/883B	Complete 12-Bit 12 μ s ADC**	5962-8876404XX*	AD7828UQ/883B	8-Channel 8-Bit ADC**
5962-87591023X	AD7572TE12/883B	Complete 12-Bit 12 μ s ADC**	5962-8962901LX*	AD7569SQ/883B	Complete 8-Bit Analog I/O Sys**
5962-8759103LX	AD7572UQ12/883B	Complete 12-Bit 12 μ s ADC**	5962-8962902LX	AD7569TQ/883B	Complete 8-Bit Analog I/O Sys**
5962-87591033X	AD7572UE12/883B	Complete 12-Bit 12 μ s ADC**	8300201JC	AD DAC87/883B	12-Bit Hybrid DAC
5962-8759104LX	AD7572SQ05/883B	Complete 12-Bit 5 μ s ADC**	8300301JA	AD DAC87/883B	12-Bit Monolithic DAC
5962-87591043X	AD7572SE05/883B	Complete 12-Bit 5 μ s ADC**	5962-8965701LX*	AD7547SQ/883B	12-Bit Dual Multiplying DAC**
5962-8759105LX	AD7572TQ05/883B	Complete 12-Bit 5 μ s ADC**	5962-8965702LX*	AD7547TQ/883B	12-Bit Dual Multiplying DAC**
5962-87591053X	AD7572TE05/883B	Complete 12-Bit 5 μ s ADC**	5962-8965703LX*	AD7547UQ/883B	12-Bit Dual Multiplying DAC**
5962-8759106LX	AD7572UQ05/883B	Complete 12-Bit 5 μ s ADC**	5962-8776301LX	AD7537SQ/883B	12-Bit Dual Multiplying DAC**
5962-87591063X	AD7572UE05/883B	Complete 12-Bit 5 μ s ADC**	5962-87763013X	AD7537SE/883B	12-Bit Dual Multiplying DAC**
5962-8861501XA	AD674AUD/883B	Complete 12-Bit ADC**	5962-8776302LX	AD7537TQ/883B	12-Bit Dual Multiplying DAC**
5962-8861502XA	AD674ATD/883B	Complete 12-Bit ADC**	5962-87763023X	AD7537TE/883B	12-Bit Dual Multiplying DAC**
5962-8850501RA	AD573SD/883B	10-Bit ADC	5962-8776303LX	AD7537UQ/883B	12-Bit Dual Multiplying DAC**
5962-8680202VA	AD571SD/883B	Complete 10-Bit ADC	5962-87763033X	AD7537UE/883B	12-Bit Dual Multiplying DAC**
5962-8680201VA	AD570SD/883B	Complete 8-Bit ADC	5962-8876501RX*	AD7549SQ/883B	12-Bit Dual DAC**
5962-8961601YX*	AD7574SQ/883B	8-Bit ADC**	5962-8876502RX*	AD7549TQ/883B	12-Bit Dual DAC**
5962-8961602YX*	AD7574TQ/883B	8-Bit ADC**	5962-8876601LX*	AD7245SQ/883B	12-Bit DACPORT TM **
5962-8776201VX	AD7575SQ/883B	8-Bit ADC with T/H	5962-8876602RX*	AD7248SQ/883B	12-Bit DACPORT TM **
5962-8776202VX	AD7575TQ/883B	8-Bit ADC with T/H	5962-8876701LX*	AD7845SQ/883B	12-Bit V _{OUT} Multiplying DAC**
5962-87762012X	AD7575SE/883B	8-Bit ADC with T/H	5962-8770201RX	AD7545SQ/883B	12-Bit Multiplying DAC**
5962-87762022X	AD7575TE/883B	8-Bit ADC with T/H	5962-8770202RX	AD7545TQ/883B	12-Bit Multiplying DAC**
5962-8763501RA	AD670SD/883B	Signal Conditioning 8-Bit ADC**	5962-8770203RX	AD7545UQ/883B	12-Bit Multiplying DAC**
5962-8850502RA	AD673SD/883B	8-Bit ADC	5962-8770204RX	AD7545GUQ/883B	12-Bit Multiplying DAC**

*Release Pending

** μ P Compatible

Products Available to Standard Military Drawings

SMD Part Number	Generic Part Number	Description	SMD Part Number	Generic Part Number	Description
5962-87702012X	AD7545SE/883B	12-Bit Multiplying DAC**	5962-8503002XC	AD2700UD/883B	Precision +10 V Reference
5962-87702022X	AD7545TE/883B	12-Bit Multiplying DAC**	5962-8503003XC	AD2702SD/883B	Precision ± 10 V Reference
5962-87702032X	AD7545UE/883B	12-Bit Multiplying DAC**	5962-8503004XC	AD2702UD/883B	Precision ± 10 V Reference
5962-87702042X	AD7545GUE/883B	12-Bit Multiplying DAC**	5962-8686101XC	AD580SH/883B	Precision +2.5 V Reference
5962-8780101XA	AD567SD/883B	12-Bit High Speed DAC**	5962-8686102XC	AD580TH/883B	Precision +2.5 V Reference
5962-8865901A	AD667SD/883B	12-Bit Dual Buffered DAC**	5962-8757101XC	AD590JF/883B	Temp. Transducer 1 μ A/K
5962-8850901X	AD390SD/883B	12-Bit Quad DAC	5962-8757101YC	AD590JH/883B	Temp. Transducer 1 μ A/K
5962-8850902X	AD390TD/883B	12-Bit Quad DAC	5962-8757102XC	AD590KF/883B	Temp. Transducer 1 μ A/K
5962-8851001X	AD394SD/883B	12-Bit Quad DAC	5962-8757102YC	AD590KH/883B	Temp. Transducer 1 μ A/K
5962-8851002X	AD394TD/883B	12-Bit Quad DAC	5962-8757103XC	AD590LF/883B	Temp. Transducer 1 μ A/K
5962-8851003X	AD395SD/883B	12-Bit Quad DAC	5962-8757103YC	AD590LH/883B	Temp. Transducer 1 μ A/K
5962-8851004X	AD395TD/883B	12-Bit Quad DAC	5962-8757104XC	AD590MF/883B	Temp. Transducer 1 μ A/K
5962-8770001EX	AD7524SQ/883B	8-Bit DAC**	5962-8757104YC	AD590MH/883B	Temp. Transducer 1 μ A/K
5962-8770002EX	AD7524TQ/883B	8-Bit DAC**	5962-7801903EA	AD96687TQ/883B	Voltage Comparator
5962-8770003EX	AD7524UQ/883B	8-Bit DAC**	5962-78019032A	AD96687TE/883B	Voltage Comparator
5962-87700012X	AD7524SE/883B	8-Bit DAC**	5962-8600804EA*	AD96685TQ/883B	Voltage Comparator
5962-87700022X	AD7524TE/883B	8-Bit DAC**	5962-86008042A*	AD96685TE/883B	Voltage Comparator
5962-87700032X	AD7524UE/883B	8-Bit DAC**	5962-8600804IA*	AD96685TH/883B	Voltage Comparator
5962-8770101RX	AD7528SQ/883B	8-Bit Dual Buffered DAC**	5962-8754001CA	AD585SQ/883B	High Speed S/H Amp
5962-87701012X	AD7528SE/883B	8-Bit Dual Buffered DAC**	5962-87719	AD625/883B	Instrumentation Amp
5962-8770102RX	AD7528TQ/883B	8-Bit Dual Buffered DAC**	5962-88539	AD524/883B	Instrumentation Amp
5962-87701022X	AD7528TE/883B	8-Bit Dual Buffered DAC**	5962-8857901XC	HOS-050A/883B	Video Op Amp
5962-8770103RX	AD7528UQ/883B	8-Bit Dual Buffered DAC**	5962-8857902XC	HOS-060SH/883B	Video Op Amp
5962-87701032X	AD7528UE/883B	8-Bit Dual Buffered DAC**	7705201EX	ADG508ATQ/883B	8-Channel Analog MUX
5962-8778901EA	AD558SD/883B	8-Bit DACPORT TM **	5962-8768901VX	ADG528ATQ/883B	8-Channel Latched MUX
5962-8778902EA	AD558TD/883B	8-Bit DACPORT TM **	77052012X*	ADG508ATE/883B	8-Channel Analog MUX
5962-8780201RX	AD7226TQ/883B	8-Bit Quad DAC with Amps**	5962-8671601EX	ADG201HSTQ/883B	Quad SPST Fast Switch
5962-87802012X	AD7226TE/883B	8-Bit Quad DAC with Amps**	5962-86716012X	ADG201HSTE/883B	Quad SPST Fast Switch
5962-8866301LX	AD7228TQ/883B	8-Bit Octal Voltage Out DAC**	77053022X	ADG201ATE/883B	Quad SPST Analog Switch
5962-88663013X	AD7228TE/883B	8-Bit Octal Voltage Out DAC**	7705302EX	ADG201ATQ/883B	Quad SPST Analog Switch
5962-8866302LX	AD7228UQ/883B	8-Bit Octal Voltage Out DAC**	5962-8773501	ADSP-2100SG/883B	6 MHz Digital Signal μ P
5962-88663023X	AD7228UE/883B	8-Bit Octal Voltage out DAC**	5962-8773503	ADSP-2100ASG/883B	8 MHz Digital Signal μ P
5962-8503001XC	AD2700SD/883B	Precision +10 V Reference	5962-8773504	ADSP-2100ATG/883B	10 MHz Digital Signal μ P

MIL-STD-883 Class B Products

AD346	AD558	AD624	AD746	AD5539	AD7535	AD7840	ADSP-1009A
AD380	AD561	AD625	AD767	AD7111	AD7536	AD7845	ADSP-1010A
AD381	AD562	AD630	AD790	AD7118	AD7537	AD7846	ADSP-1012A
AD382	AD563	AD632	AD834	AD7224	AD7541 & A	AD7870	ADSP-1016A
AD390	AD565A	AD637	AD840	AD7225	AD7542	AD9000	ADSP-1024A
AD394	AD566A	AD639	AD841	AD7226	AD7543	AD9002	ADSP-1080A/81A
AD395	AD567	AD640	AD842	AD7228	AD7545 & A	AD9012	ADSP-1110
AD396	AD568	AD642	AD843	AD7237	AD7547	AD9048	ADSP-1401/10
AD509	AD569	AD644	AD844	AD7245	AD7548/49	AD9610	ADSP-2100 & A
AD517	AD570	AD647	AD845	AD7247	AD7569	AD96687	ADSP-3210/20
AD518	AD571	AD648	AD846	AD7248	AD7572	AD ADC85/7	ADSP-3211
AD521	AD572	AD650	AD847	AD7501	AD7574	AD DAC87	ADSP-3220
AD522	AD573	AD652	AD848	AD7502	AD7575	ADG201A & HS	ADSP-3221
AD524	AD574A	AD664	AD849	AD7503	AD7576	ADG202A	ADV453
AD526	AD578	AD667	AD1330	AD7506	AD7578	ADG221	ADVFC32
AD532	AD579	AD670	AD1332	AD7507	AD7579	ADG222	HDS-1250
AD534	AD580	AD673	AD1334	AD7510DI	AD7580	ADG506A/507A	HOS-050A/060SH
AD536A	AD581	AD674A	AD1362	AD7511DI	AD7582	ADG508A/509A	HTC-0300A
AD537	AD582	AD689	AD1378	AD7512DI	AD7590/1DI	ADG526A/527A	
AD538	AD584	AD707	AD2700	AD7520	AD7592DI	ADG528A/529A	
AD539	AD585	AD708	AD2701	AD7521	AD7628	AD OP-07	
AD542	AD586	AD711	AD2702	AD7522	AD7672	AD OP-27	
AD544	AD587	AD712	AD3860	AD7524	AD7820	AD OP-37	
AD547	AD588	AD713	AD5200 Series	AD7528	AD7821	ADREF01	
AD548	AD589	AD741	AD5210 Series	AD7533	AD7824	ADREF02	
AD549	AD590	AD744	AD5240	AD7534	AD7828	ADSP-1008A	

Boldface indicates new MIL-STD-883 Class B Product availability since publication of our most recent Databooks. For status of specific parts, please contact your local salesperson. Due to the nature of slash sheet and MIL drawing development, the availability of parts is difficult to predict. This list will be updated and published in *Analog Briefings* every six months.

JAN QPL Products

JAN Part Number	Generic Part Number	Description	JAN Part Number	Generic Part Number	Description
JM38510/14001BXA*	AD574AUD	Complete, 12-Bit ADC**	JM38510/13901BIA	AD534TH	Analog Multiplier, Prog. Scale
JM38510/14002BXA*	AD574ATD	Complete, 12-Bit ADC**	JM38510/13901BCA	AD534TD	Analog Multiplier, Prog. Scale
JM38510/12101BJC	AD562SD	12-Bit Current Output DAC	JM38510/13902BCA	AD534SD	Analog Multiplier, Prog. Scale
JM38510/12103BJC	AD565SD	12-Bit Current Output DAC	JM38510/13902BIA	AD534SH	Analog Multiplier, Prog. Scale
JM38510/12702BEC	AD7520UD	10-Bit Multiplying DAC	JM38510/13903BIA	AD532SH	Analog Multiplier, Fixed Scale
JM38510/13301BEA	AD561SD	10-Bit DAC, I-Out	JM38510/13903BCA	AD532SD	Analog Multiplier, Fixed Scale
JM38510/12801BGC, A	AD584SH	Multi-Tap Reference			
JM38510/12802BGC, A	AD584TH	Multi-Tap Reference			

*Release Pending ** μ P Compatible

Application Specific Integrated Circuits

Analog Devices offers a full spectrum of capabilities in mixed-signal application specific integrated circuits (ASICs). These chip-level systems can implement combined analog/digital designs with 12-bit accuracy and 16-bit resolution that formerly required board-level solutions.

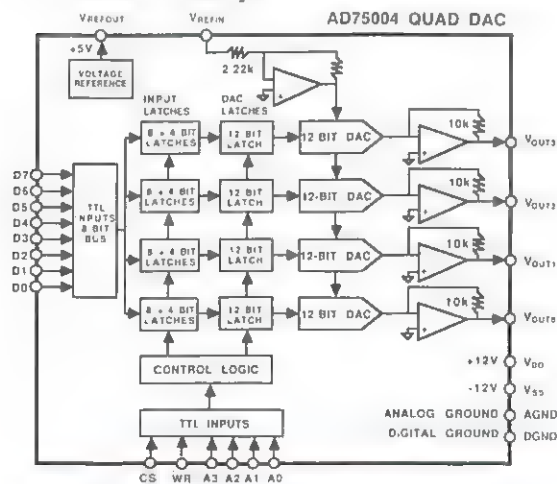
Analog Devices can incorporate most of the functions of its standard monolithic parts in full-custom and semicustom ICs. Full-custom parts optimize performance and space requirements, while cell-based semicustom parts reduce development time and engineering expense. Development costs can be cut further by tailoring a predefined system-on-a-chip known as a Linear System Macro to your application.

Analog's experienced design engineers work with powerful computer-aided design tools to design and lay out your circuit. Design centers are currently in Massachusetts, England and Ireland.

Multiple locations for fabrication, assembly and testing ensure a ready supply of production parts. Products can be processed in full MIL-38510 certified facilities.

DESIGN EXAMPLES

Analog Devices has created a variety of customer-specific and function-specific ASIC parts. Described here are two Linear System Macros, a custom chip set and a semicustom chip.

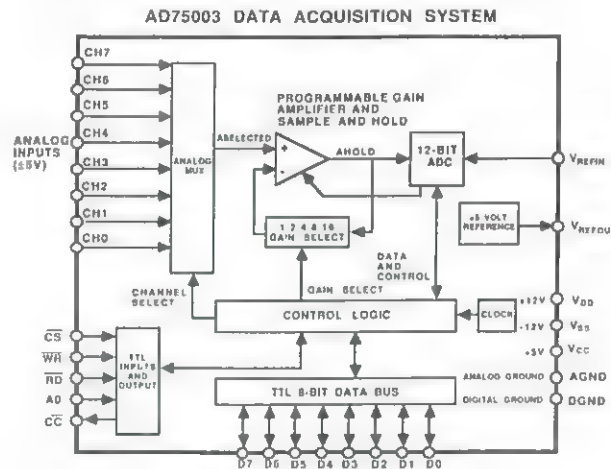


AD75004 Quad DAC

This circuit contains four separate 12-bit D/A converters with amplifiers for voltage output and an on-board reference. Double-buffering latches interface with an 8-bit parallel bus and permit updating of all four channels individually or simultaneously.

AD75003 Data Acquisition System

This DAS converts analog signals on 8 input channels to 12-bit values and interfaces via an 8-bit parallel bus. The chip integrates an 8-channel multiplexer, programmable-gain amplifier, sample-and-hold and 12-bit A/D converter with internal voltage reference.



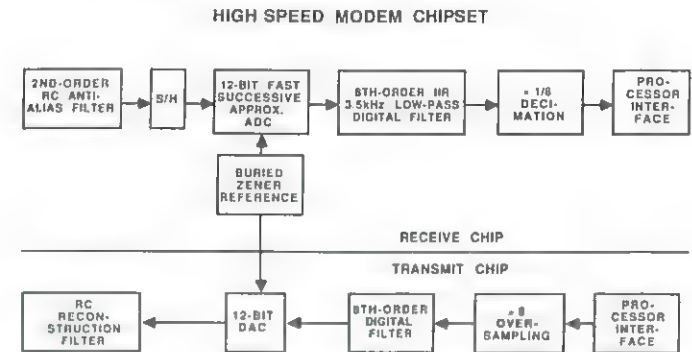
Derivative Circuits

The circuits outlined above can be modified to suit a specific customer's application. One such device is a semicustom, serial-interface DAS. The AD75003 design was altered to have programmable gains of 1 to 20 instead of 1 to 16, and a serial UART instead of an 8-bit parallel interface. In addition to the AD75003 functions, this part contains a precision instrumentation amplifier, a programmable line-frequency notch filter, a 7-bit trim DAC and a temperature sensor.

Modem Chip Set

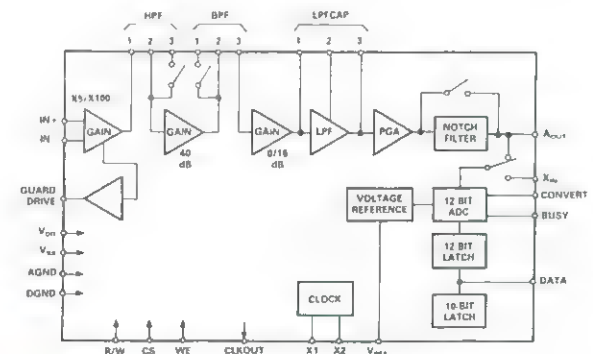
Library cells can be combined to form macro building blocks for high speed modems. This two-chip design concept filters and converts data to interface a digital signal processor with the analog circuitry of a 9600-

baud modem. On one chip, the received signal passes through an antialiasing filter, sample-and-hold, 12-bit A/D converter, 8th-order digital filter and decimation. On the other chip, transmit data is $3 \times$ oversampled, then goes to an 8th-order filter, a 12-bit DAC and an active reconstruction filter.



ADXN15 Medical DAS

This circuit is a complete data acquisition system for biomedical signals (i.e., ECG and EEG) with a throughput of 10,000 samples per second. It provides high accuracy, high stability and functional completeness in a small 28-pin PLCC package. It includes a high performance instrumentation amp, bandpass and notch filters, and a 12-bit ADC with on-chip reference. It also includes a fast 8/12-bit serial port to interface to most microprocessor systems.



HIGH PERFORMANCE PROCESSES

Analog Devices' semicustom and custom circuits are fabricated using the same high performance processes as our standard ICs. These technologies include two mixed bipolar-CMOS processes and a high voltage CMOS process. These processes include thin-film resistors which may be laser trimmed for precise matching and stable performance over a wide temperature range.

The BiMOS II and Linear Compatible CMOS (LC²MOS) processes combine bipolar and CMOS devices on one chip. Functional density is an order of magnitude greater than previous mixed-signal processes; over 20,000 devices can be placed on a single chip. Bipolar transistors provide low noise, low offset input stages and high power output stages. The CMOS devices offer high input impedance, and make dense logic and good switches for data converters, multiplexers and switched-capacitor filters. LC²MOS also provides a JFET for very low input noise.

The bipolar-CMOS processes operate on supply voltages ranging from single +5 volts to split ± 15 V, with signal levels ranging from single-ended +3 V to ± 10 V. These processes are ideally suited for applications in data acquisition, instrumentation, industrial automation and telecommunications.

The High Voltage Switch (HVS) process provides quality analog switches that can operate with supply voltages up to ± 22 volts. It can combine switches and multiplexers with CMOS logic.

The following table summarizes the processes available for designing ASICs. Other processes in development offer even higher speed, denser logic and higher integration of analog and digital functions.

CELL LIBRARIES

Cell libraries for the bipolar CMOS processes are described below. These libraries are growing with the development of new processes, macrocells and cells. Many new catalog parts will also be available as cells. Your local sales office can give you current information on the cell libraries and available Linear System Macros.

ANALOG DEVICES HIGH PERFORMANCE PROCESSES FOR ASICS

Process	Power	Signal	Features
BiMOS II	± 12 V	± 8 V	Wide Variety of Precision Linear and Digital Functions
LC ² MOS	+5 V to ± 15 V	+3 V to ± 10 V	Wide Variety of Precision Linear and Digital Functions
HVS	+5 V to ± 22 V	+2 V to ± 18 V	High Voltage Switches, Muxes and Logic Functions

Operational amplifiers are available in bipolar, JFET and CMOS configurations. Representative bipolar op amp cells have performance characteristics similar to an AD OP-27 and a slew-enhanced AD741. The LC²MOS process offers JFET op amps, including an AD711 equivalent.

Instrumentation amplifiers with performance comparable to the AD521 and AD524 are available. Linear comparators have response times down to 100 nanoseconds and strobed comparators have setup/access times down to 50 nanoseconds.

Digital-to-analog converters range in resolution from 8 to 14 bits, and include cells similar to the AD667 and AD1856. Analog-to-digital converters vary from 8 to 16 bits in resolution, and include cells equivalent to the AD7572 and AD674. One half-flash ADC cell converts to 8-bit accuracy in 500 nanoseconds, and one successive approximation cell converts to 12 bits in 5 microseconds.

Support cells include sample-and-hold amplifiers with performance comparable to the AD585, low-voltage bandgap references comparable to the AD584 and low noise buried Zener references.

RC active filters and programmable switched-capacitor filters are available with specifications in these ranges:

Topology: all classical filter types

Frequency Range: 200 Hz to 20 kHz (switched-cap) or 100 Hz to 1 MHz (RC)

Number of Sections: up to 10th-order (switched-cap) or 4th-order (RC)

Signal/Noise and THD: >72 dB, compatible with 12-bit data acquisition.

Logic cells include gates, counters, registers, PLA, RAM and ROM. Interface cells include 8-bit and 16-

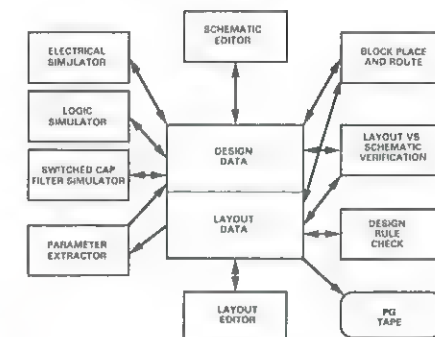
bit parallel I/O ports as well as synchronous serial ports and UARTS.

COMPUTER-AIDED DESIGN TOOLS

Designing a high performance mixed-signal IC is inherently more difficult than designing a gate array. The variety of analog and digital functions requires a cell-based approach. However, the use of powerful tools gives high confidence of functionality at first silicon through thorough simulation and layout verification. Complete computer-generated documentation of all schematics and analog and logic simulation waveforms permits thorough evaluation of Analog's design by your design staff before signoff for final layout and fabrication.

The overall work flow through the CAD environment is shown below. Key to meeting the special challenges of mixed analog/digital circuitry are the simulation and auto-layout tools, and the unification of design and layout information in a single database. Analog Devices has developed a suite of proprietary computer-aided design tools, called Janus, to address these issues and to implement turn-key designs.

Computer-Aided Design Flow



Application Specific Integrated Circuits

The Janus schematic editor offers numerous time-saving techniques and provides for specification of such data as wire widths, routing layers and routing priorities. It automatically generates a netlist used by subsequent tools.

Analog uses several simulators, including electrical, logic and behavioral types. ADICE, a proprietary enhanced version of the SPICE electrical simulator, gives precision simulation of critical analog sections. It uses Newton-Raphson methods to iteratively solve non-linear time-dependent simultaneous differential equations. It is efficient for circuits up to about 250 active devices and is used for the frequency domain or transient analysis of analog cells such as op amps, or sensitive digital cells such as dynamic RAM.

Event-driven simulators handle larger circuits, with thousands of devices, and are typically used to simulate logic. The Janus mixed-signal simulator combines an event-driven simulator with Newton-Raphson methods. It dynamically partitions the circuit to apply the faster event-driven techniques where possible, and the matrix methods where necessary. It also dynamically sizes the matrix and time steps to speed simulation further. The simulator can operate at the transistor level or use behavioral models, or both at the same time, allowing trade-offs between accuracy and speed.

For layout, the challenge is to increase automation while accommodating the layout sensitivity of analog circuitry. Device generators exist for the full range of active and passive devices available in the technology to automatically create a physical representation of the circuit schematic. This layout may be optimized through conventional interactive polygon-pushing.

The Janus placement editor starts with a topological placement based on the schematic, and uses simulated annealing to automatically place devices and cells. The user may define the cost function for the annealer; the default version comprehends such analog concerns as thermal and electrical matching and device and cell grouping, as well as cell overlap, net length, and die area.

The Janus routing editor is driven by the connectivity of the schematics, but allows great freedom to manually control the routing of critical analog signal paths or power/ground lines while autorouting noncritical nets and spacing the layout to achieve automatic enforcement of layout rules. The Janus routing editor uses up to three interconnect levels, and will automatically expand and compact placement as necessary to achieve 100% routing.

Finally, industry-standard layout verification tools assure conformance of the layout to both the schematic and design rules to give high confidence of functionality in first silicon. The CAD tool suite communicates via industry-standard stream formats to external databases and pattern generators.

TEST AND TRIM

Analog Devices has over 20 years of experience in testing complex circuits and manufactures commercial test systems for precision linear ICs. In each fabrication facility, a computer network integrates Analog Devices, Teradyne and LTX test equipment. The design, wafer probe and test areas share data on the network for statistical analysis and device modelling.

All Analog Devices ASICs are tested at the wafer level, and most are laser-wafer trimmed to achieve high accuracy. Untrimmed thin-film resistors match within 1% to 0.1%, depending on area. Trimmed resistors can match to better than 0.01%. Wafers may be laser drift trimmed with a hot-chuck probe to minimize the effects of temperature on accuracy.

After packaging, all parts are tested to assure that they meet guaranteed specifications. Environmental handlers can verify parts at multiple temperatures. Burn-in is performed as specified by the customer.

PACKAGING

Analog Devices ICs are available in most modern package types, including high pin-count and surface mount varieties. ASICs may be assembled in any of Analog Devices' standard packages, listed below. This list is

constantly expanded and other packages may be used if they are suitable for high performance applications.

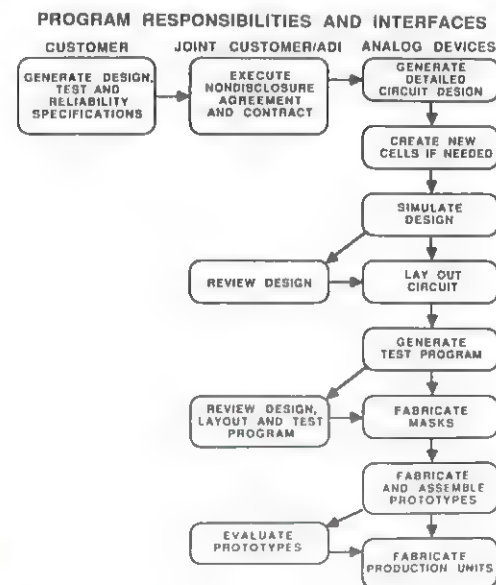
Available Packages

Pin-grid array (PGA): 68 to 144 pins
Leaded ceramic chip carrier (LDCC): 44 pins
Leadless ceramic chip carrier (LCC): 20 to 68 I/Os
Plastic quad flat pack (PQFP): 100 pins
Plastic leaded chip carrier (PLCC): 20 to 68 pins
Plastic dual in-line package (DIP): 14 to 64 pins
Side-brazed DIP: 14 to 64 pins
Frit-seal DIP (Cerdip): 14 to 40 pins
Small outline (SO): 14 to 28 pins

PROGRAM RESPONSIBILITIES AND INTERFACES

The following figure shows the major phases in developing an ASIC and responsibilities during each phase. The overall development time depends on the complexity of the circuit and on how custom the design is.

Your Analog Devices Sales Engineer is your first interface for ASIC development. Your local sales office can provide further information on Analog Devices' custom/semicustom capabilities.



Modular AC/DC Power Supplies

GENERAL DESCRIPTION

Analog Devices offers a broad line of modular ac/dc power supplies that provide both OEMs and designers a reliable, easy to use, low-cost solution to their power requirements. Models are available in PC mountable and chassis mountable designs with 5 volt to 15 volt (single, dual, triple) outputs and current ratings from 25 mA to 5 amps. Since these modular supplies are fully encapsulated, no trimming or external component selection is necessary; simply mount the unit, connect

power and output leads, and you're on the air! Most Analog Devices' power supplies are available from stock in both large and small quantities with substantial discounts being applied to large quantity orders.

AC/DC POWER SUPPLY FEATURES

- Current Limit Short Circuit Protection
- PC Mounted and Chassis Mounted Versions
- Single (+5 V), Dual (± 12 V, ± 15 V), and Triple (± 15 V/+5 V, ± 15 V/+1 V to +15 V) Output Supplies

- Current Outputs:
25 mA to 1000 mA for Dual and Triple Output Supplies
250 mA to 5000 mA for Single Output Supplies
- Wide Input Voltage Range
- Low Output Ripple and Noise
- Excellent Line & Load Regulation Characteristics
- High Temperature Stability
- Free-Air Convection Cooling; No External Heat Sink Required

SPECIFICATIONS – Typical (@ +25°C and 115 V ac 60 Hz unless otherwise noted*)

Type	Model	Output Voltage Volts	Output Current mA	Line Reg. max %	Load Reg. max %	Output Voltage Error max	Ripple & Noise mV rms max	Dimensions Inches
PC Board Mounted	904	± 15	± 50	0.02	0.02	± 200 mV –0 mV	0.5	3.5×2.5×0.875
	902	± 15	± 100	0.02	0.02	+300 mV –0 mV	0.5	3.5×2.5×1.25
	902-2	± 15	± 100	0.02	0.02	+300 mV –0 mV	0.5	3.5×2.5×0.875
	920	± 15	± 200	0.02	0.02	+300 mV –0 mV	0.5	3.5×2.5×1.25
	925	± 15	± 350	0.02	0.02	$\pm 1\%$	0.5	3.5×2.5×1.62
	921	± 12	± 240	0.02	0.02	+300 mV –0 mV	0.5	3.5×2.5×1.25
	905	5	1000	0.02	0.05	$\pm 1\%$	1	3.5×2.5×1.25
	922	5	2000	0.02	0.05	$\pm 1\%$	1	3.5×2.5×1.62
	928	5	3000	0.05	0.10	$\pm 2\%$	5 (typ)	3.5×2.5×1.25
	923	± 15 +5	± 100 500	0.02 0.02	0.02 0.05	$\pm 1\%$ –1%	0.5 0.5	3.5×2.5×1.25
	927	± 15 +5	± 150 1000	0.02 0.02	0.02 0.10	$\pm 2\%$ $\pm 2\%$	0.5 (typ) 1.0 (typ)	3.5×2.5×1.62
	2B35J	± 15 +1 to +15**	± 65 125	0.08 0.08	0.10 0.10	(–0, +300 mV)	0.5 0.25	3.5×2.5×1.25
	2B35K	± 15 +1 to +15**	± 65 125	0.01 0.01	0.02 0.02	(–0, +300 mV)	0.5 0.25	3.5×2.5×1.25
	952	± 15	± 100	0.05	0.05	$\pm 2\%$	1	4.4×2.7×1.45
	970	± 15	± 200	0.05	0.05	$\pm 2\%$	1	4.4×2.7×1.45
Chassis Mounted	973	± 15	± 350	0.05	0.05	$\pm 2\%$	1	4.4×2.7×2.00
	975	± 15	± 500	0.05	0.05	+2%	1	4.4×2.7×2.00
	955	5	1000	0.05	0.15	$\pm 2\%$	2	4.4×2.7×1.45
	976	5	3000	0.05	0.10	$\pm 2\%$	5 (typ)	4.75×2.7×1.45
	977	5	5000	0.05	0.10	$\pm 2\%$	5 (typ)	4.75×2.7×1.45
	972	± 15 +5	± 150 300	0.02 0.02	0.02 0.10	$\pm 2\%$ $\pm 2\%$	0.5 (typ) 1.0 (typ)	4.75×2.7×1.45
	974	± 15 +5	± 150 1000	0.02 0.02	0.02 0.10	$\pm 2\%$ $\pm 2\%$	0.5 (typ) 1.0 (typ)	4.75×2.7×1.45

*Consult Analog Devices Power Supplies Catalog for additional information.

**Resistor programmable

Specifications subject to change without notice.

GENERAL SPECIFICATIONS

Power Requirements

Input Voltage Range: 105 V ac to 125 V ac
Frequency: 50 Hz to 250 Hz

Electrical Specifications

Temperature Coefficient: 0.02%/°C
Output Voltage Accuracy: $\pm 2\%$, max
See Specifications Table
Breakdown Voltage: 500 V rms, min
Isolation Resistance: 50 M Ω
Short Circuit Protection: All ac/dc power supplies employ current limiting. They can withstand substantial overload including direct short. Prolonged operation should be avoided since excessive temperature rises will occur.

Environmental Requirements

Operating Temperature Range: –25°C to +71°C
Storage Temperature Range: –25°C to +85°C

Modular DC/DC Converters

GENERAL DESCRIPTION

Analog Devices' line of compact dc/dc converters offers system designers a means of supplying a reliable, easy to use, low cost solution to a variety of floating (analog and digital) power applications. These devices provide high accuracy, short circuit protected, regulated outputs with very low output noise and ripple characteristics.

Fourteen models are offered in five power levels of 1 watt, 1.8 watts, 4.5 watts, 6 watts and 12 watts. Input voltage versions include 5 volt, 12 volt, 24 volt and 28 volt with output ranges as follows: +5 volt, ± 12 volts and ± 15 volts at ± 60 mA to 1000 mA output current capability.

Most models are high efficiency (typically over 60% at full load) and feature complete 6-sided continuous shielding for EMI/RFI protection. A π -type input filter is contained, in some models, which virtually eliminates the effects of reflected input ripple current. Most Analog Devices' dc/dc converters are available from stock in both large and small quantities with substantial discounts being applied to large quantity orders.

DC/DC POWER SUPPLY FEATURES

- Inaudible (>20 kHz) Converter Switching Frequency
- Continuous, Six-Sided EMI/RFI Shielding Except on 1 Watt and 1.8 Watt Models
- Output Short Circuit Protection (Either Output to Common)
- Automatic Restart After Short Condition Removed
- Automatic Starting with Reverse Current Injected into Outputs
- Low Output Ripple and Noise
- High Temperature Stability
- Free Air Convection Cooling

No external heat sink or specification derating is required over the operating temperature range.

GENERAL SPECIFICATIONS FOR 1 W AND 1.8 W MODELS

Line Regulation – Full Range: $\pm 0.3\%$ ($\pm 1\%$ max, 949)

Load Regulation – No Load to Full Load: $\pm 0.4\%$ ($\pm 0.5\%$ max, 949)

Output Noise and Ripple: 20 mV p-p, with 15 μ F tantalum capacitor across each output (2 mV rms max, 949)

Breakdown Voltage: 300 V dc min (500 V dc min, 949)

Input Filter Type: π

Operating Temperature Range: -25°C to $+71^{\circ}\text{C}$

Storage Temperature Range: -40°C to $+125^{\circ}\text{C}$ ($+100^{\circ}\text{C}$, 949)

Fusing: If input fusing is desired, we recommend the use of a slow blow type fuse that is rated at 150%–200% of the dc/dc converter's full load input current.

GENERAL SPECIFICATIONS FOR 4.5 W, 6 W AND 12 W MODELS

Line Regulation – Full Range: $\pm 0.07\%$ max ($\pm 0.02\%$ max, 951, 960 Series) ($\pm 0.1\%$ max, 943)

Load Regulation – No Load to Full Load: $\pm 0.07\%$ max ($\pm 0.02\%$ max, 951, 960 Series) ($\pm 0.1\%$ max, 943)

Output Noise and Ripple: 1 mV rms max

Breakdown Voltage: 500 V dc min

Input Filter Type: π

Operating Temperature Range: -25°C to $+71^{\circ}\text{C}$

Storage Temperature Range: -40°C to $+125^{\circ}\text{C}$

Fusing: If input fusing is desired, we recommend the use of a slow blow type fuse that is rated at 150%–200% of the dc/dc converter's full load input current.

Model	Output Voltage Volts	Output Current mA	Input Voltage Volts	Input ¹ Voltage Range Volts	Input Current Full Load	Output Voltage Error max	Temperature Coefficient $^{\circ}\text{C}$ max	Efficiency Full Load min	Dimensions Inches
943	5	1000	5	4.75/5.25	1.52 A	$\pm 1\%$	$\pm 0.02\%$	62%	2.0 \times 2.0 \times 0.38
958	5	100	5	4.5/5.5	200 mA	$\pm 5\%$	-0.01% (typ)	50%	1.25 \times 0.8 \times 0.4
941	± 12	± 150	5	4.75/5.25	1.17 A	$\pm 1\%$	$\pm 0.01\%$	58%	2.0 \times 2.0 \times 0.38
960	± 12	± 40	5	4.5/5.5	384 mA	$\pm 5\%$	$\pm 0.01\%$ (typ)	50%	1.25 \times 0.8 \times 0.4
962	± 15	± 33	5	4.5/5.5	396 mA	$\pm 5\%$	$\pm 0.01\%$ (typ)	50%	1.25 \times 0.8 \times 0.4
964	± 15	± 33	12	10.8/13.2	165 mA	$\pm 5\%$	$\pm 0.01\%$ (typ)	50%	1.25 \times 0.8 \times 0.4
965	± 15	± 190	5	4.65/5.5	1.7 A	$\pm 1\%$	$\pm 0.005\%$ (typ)	62% (typ)	2.0 \times 2.0 \times 0.38
966	± 15	± 190	12	11.2/13.2	710 mA	$\pm 1\%$	$\pm 0.005\%$ (typ)	62% (typ)	2.0 \times 2.0 \times 0.38
967	± 15	± 190	24	22.3/26.4	350 mA	$\pm 1\%$	$\pm 0.005\%$ (typ)	62% (typ)	2.0 \times 2.0 \times 0.38
949	± 15	$\pm 60^{**}$	5	4.65/5.5	0.6 A	$\pm 2\%$	$\pm 0.03\%$	58%	2.0 \times 1.0 \times 0.375
940	± 15	± 150	5	4.75/5.25	1.35 A	$\pm 1\%$	$\pm 0.01\%$	62%	2.0 \times 2.0 \times 0.38
953	± 15	± 150	12	11/13	0.6 A	$\pm 0.5\%$	$\pm 0.01\%$	62%	2.0 \times 2.0 \times 0.38
945	± 15	± 150	28	23/31	250 mA	$\pm 0.5\%$	$\pm 0.01\%$	61%	2.0 \times 2.0 \times 0.38
951	± 15	± 410	5	4.65/5.5	3.7 A	$\pm 0.5\%$	$\pm 0.01\%$	62%	3.5 \times 2.5 \times 0.88

NOTES

¹Models 940 and 941 will deliver up to 120 mA output current (and Model 943 will deliver up to 600 mA) over an input voltage range of 4.65 V dc and 5.5 V dc.

*Consult Analog Devices Power Supplies Catalog for additional information.

**Single-ended or unbalanced operation is permissible such that total output current load does not exceed a total of 120 mA. Specifications subject to change without notice.

LTS-2020 Component Test Systems

THE LTS CONCEPT

The LTS-2020 is a versatile component test system which tests a multitude of components to the manufacturer's specifications (linear, digital, data conversion, and discrete devices). The system offers such features as RS-232 ports for networking, IEEE for compatibility with handlers and probers, dual disk drives for mass storage of data, automatic self-calibration, and a full statistical analysis software package.

The LTS-2020 provides several data output formats – datalog, yield analysis, and statistical analysis. The console provides the primary measurement and control functions to test a specific class of devices. The socket assembly is the mechanical and electronic interface for the family board and the DUT board. The DUT board plugs directly into the socket assembly and contains the circuitry and socket, specific to the actual device under test.

Analog Devices' component test systems are the first benchtop testers that are programmable in BASIC and fill-in-the-blanks CREATE. CREATE is menu-driven software which prompts the user for data sheet limits and conditions, then builds a completed test program for the specified device. Turnkey program libraries are available for each of the device families.

Far more than just comprehensive production testers, these test systems can handle complex engineering analysis and incoming inspection. They are the first systems that can provide all the capabilities of today's large centralized test systems at a price that is approximately one-third the cost. The LTS-2020 not only provides the flexibility of distributed or decentralized testing, it allows for cost effective multiple system purchases. They increase overall test reliability since the threat of a single big failure is eliminated in a distributed testing environment.

MIXED SIGNAL TEST CAPABILITY

The LTS-2800 Mixed Signal Family Board and LTS-0680 Test Head perform a wide variety of ac and dc parametric tests on devices such as complex hybrids,

octal DACs, ASICs, converters, and pulse width modulators. The family board supplies the dc pin drivers, the dc force and measure system, a V_{CC} buffer, an rms-to-dc conversion circuit, voltage and current sources, and a 24×5 switching matrix. With its 24 programmable pin drivers, the system can provide high and low digital voltages, a three-state (high impedance) output mode, and accurate voltages and currents (V/I source).

The family board incorporates a series of 12-bit calibrated sources, used for programming V_{IL} and V_{IH} voltage levels at the digital inputs of the device under test. A threshold source for programming voltage levels on a comparator is used to detect digital output voltage levels accurately. For forcing and measuring currents, a V/I source provides and measures 10 μA to 400 mA and voltages to $\pm 20 V$.

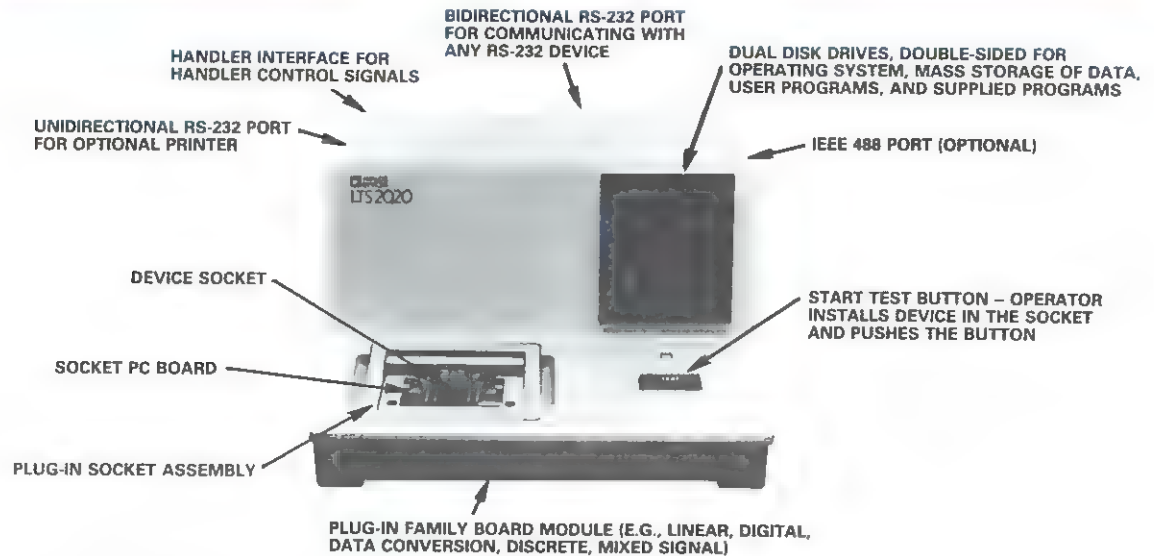
A switching matrix provides system flexibility by allowing any one of several capabilities to be switched to any of the pin drivers. These include the measure system, V/I source, V_{IH} and V_{IL} sources, the rms-to-

dc circuit, and BNC input and output connectors for interconnection with external instruments using the IEEE-488 bus.

The LTS-0680 Mixed Signal Test Head contains a precise and versatile time measure unit which provides accurate ac measurement of propagation delays, slew rates, pulse widths, and rise and fall times. It also incorporates a 16-bit user data bus, 16-bit relay driver bus, four 12-bit programmable sources, and a user's expansion board. A square wave source to the DUT provides up to ± 10 volt signals, from 1.22 kHz to 2.5 MHz.

LINEAR DEVICE TEST CAPABILITY

The LTS-2101 Operational Amplifier Family Board tests today's very demanding high precision op amps, comparators, and regulators. This board houses the test loop used in testing op amps and comparators and the pulse load circuitry used in developing the high currents needed for voltage regulator testing.



LTS-2020 Component Test Systems

For testing devices under 100 μV , the LTS-2101 offers a tight offset spec of $\pm(0.25\% + 5 \mu\text{V})$. Use of low thermal Emf relays and a test loop gain of 10,045 ensures superior low level V_{OS} measurement performance for optimum repeatability of low level signals.

Testing of low current devices is achieved with the LTS-0614 Socket Assembly which is designed to test bias and offset currents with an accuracy of $\pm(5\% + 25 \text{ fA})$ for any FET amplifier, including quad devices. Program libraries containing prewritten test programs for many standard op amps, comparators and regulators are available on disk.

ANALOG-TO-DIGITAL TEST CAPABILITY

The LTS-2200 ADC Family Board provides the test circuitry required for testing monolithic, hybrid, or modular ADCs. An on-board 16-bit microprocessor with 8K bytes of memory acts as a slave for the system console and executes preprogrammed test routines such as linearity, all codes existence, transition noise measurements, and conversion time measurements at high speed. Absolute accuracy can be measured within 200 μV . Linearity, differential nonlinearity, offset, gain, and PSSR are tested to ± 0.05 DUT LSB $+200 \mu\text{V}$. Turnkey test packages are available for many of the standard ADCs currently in use.

DIGITAL-TO-ANALOG TEST CAPABILITY

The LTS-2302 DAC Family Board utilizes advanced state-of-the-art test techniques to provide comprehensive test capabilities for a wide variety of D/A converters. It will test both voltage and current output DACs, DACs with and without buffer registers, and serial or parallel input DACs to 16-bit accuracy.

High repeatability on low level signals is achieved because of the grounding scheme on the LTS-2302. The incorporation of high level components in the V/I circuits ensures true accuracy. In addition, the methodology for measuring low bit currents allows appropriate testing of this parameter on CMOS DACs.

Output leakage current on the LTS-2302 is measured with the bit drivers to the DAC set to logic 0. Current is measured using the I to V converter. A 1 M Ω resistor within the I to V circuitry ensures sensitivity, thereby measuring current down to $\pm 1 \mu\text{A}$ full scale.

DIGITAL DEVICE TEST CAPABILITY

The LTS-2510 Digital Device Family Board provides 24-pin driver/detectors and a precision, four quadrant V/I source for testing SSI/MSI TTL and CMOS digital devices. This board contains four programmable device supplies and switching circuitry necessary for performing accurate parametric measurements on all device pins.

Together with the LTS-0655 remote ac test fixture, dynamic parametric testing of 24-pin SSI/MSI TTL digital devices can be achieved. Accuracies are achieved down to $\pm 4\% + 1.5 \text{ ns}$ at a resolution of 500 ps. Dynamic parameters tested are propagation delay, setup, and hold times.

DISCRETE DEVICE TEST CAPABILITY

The LTS-2600 Transistor Family Board tests bipolar transistors, JFETs, diodes, and optocouplers. An on-board 16-bit microprocessor with 4K bytes of memory acts as a slave for the LTS system and coordinates the timing and pulse width control of the stimulus and measurement signals. In addition, the microprocessor monitors the interlock circuitry to insure safe handling of high power test signals.

MOSFET software packages support the testing of N and P channel enhancement mode and N channel depletion mode devices. Tests which may be performed on MOSFET devices include I_{dss} , I_{gss} , I_{gssf} , I_{gssr} , I_{d} (off), I_{d} (on), $B V_{\text{dss}}$, $B V_{\text{gss}}$, $B V_{\text{gssf}}$, $B V_{\text{gssr}}$, V_{ds} (on), V_{gs} (th), V_{gsoff} , V_{sd} , R_{ds} (on), and G_{sf} .

The Smartpower Test Fixture will support fast, accurate testing of devices such as Darlington Arrays, Differential Line Drivers/Receivers, and Transceivers/Repeaters. It contains a matrix board which facilitates the muxing of High Voltage/High Current V/Is, a nonometer, diffamp, 16-bit measure system, and mecca ground reference to any one of eight matrix points at the DUT site and eight dc pin drivers programmable to any one of four modes – V/I, V_{IH} , V_{IL} or Tristate. This configuration allows true digital dc parametric testing of the front-end of smartpower devices while providing the high voltage and high current capability to test the discrete output stage.

ANALOG SWITCH TEST CAPABILITY

The LTS-2700 Analog Switch Family Board adds switch and multiplexer testing capability to the LTS-2020. This test capability, with CREATE software, allows datalogged device testing at the incoming inspection and semiconductor manufacturing levels and includes software power for use in component evaluation applications.

The LTS-2700 tests on and off drain to source leakage currents with an accuracy of 250 pA while forcing differential voltages up to 50 V ($\pm 25 \text{ V}$ from GND). Other tests performed are drain to source on resistance, greatest change in drain-source on resistance between channels, digital input current and supply current.

Twenty high integrity analog lines are provided – four to be used as drain connections and sixteen for source connections. Also provided are eight programmable digital drivers, four digital control bits, six variable power supplies, and one fixed +5 V supply. These combinations of sources provide testing of devices such as 4-channel switches, 16 to 1 multiplexers, and other combinations of switches and multiplexers.

Product Families Not Included in the Databook

The information published in this *Short Form Designers' Guide* is intended to assist the user in choosing components for the design of *new* equipment, using the most cost-effective products available from Analog Devices. The popular product types listed below may have been designed into your circuits in the past, but they are no longer likely to be the most economic choice for your new designs. Nevertheless, we recognize that it is often a wise choice to refrain from redesigning proven equipment, and we are continuing to make these products available for use in existing designs or in designs for which they are uniquely suitable. Data sheets on these products are available upon request.

AD101	AD3554	CAV-1210	IRDC1733	2B56	440
AD108/208/308	AD3860	DAC-M	MATV-0811	2B57A-1	442
AD108A/208A/308A	AD6012	DAC-QS	MATV-0816	2B58A	450
AD111/211/311	AD7110	DAC-QZ	MATV-0820	2B59A	452
AD293	AD7118	DAC-10Z	MCI1794	2S20	458
AD294	AD7506	DAC1009	MOD-1005	40	460
AD351	AD7507	DAC1108	MOD-1020	44	606
AD370/371	AD7520	DAC1132	OSC1754	45	610
AD503	AD7521	DAC1146	RDC1721	46	756
AD506	AD7522	DAC1420	RTM Series	48	903
AD507	AD7523	DAC1422	SAC1763	50	906
AD510	AD7525	DAC1423	SBCD1752/53	51	915
AD515	AD7530	DAS1128	SBCD1756/57	52	926
AD518	AD7531	DAS1150	SCDX1623	118	947
AD521	AD7541	DAS1151	SCM1677	171	959
AD528	AD7546	DAS1155	SDC1604	233	968
AD530	AD7550	DAS1156	SDC1700/RDC1700	234	
AD531	AD7552	DRC1765/66	SDC1702/RDC1702	235	
AD533	AD7571	DSC1705/06	SDC1704/RDC1704	260	
AD535	AD7574	DTM1716/17	SDC1711/RDC1711	261	
AD545	AD ADC-816	HAS-0802	SDC1721	272	
AD567	ADC-10Z	HAS-1002	SDC1725/RDC1725	273	
AD611	ADC-12QZ	HDD-1409	SDC1726/RDC1726	275	
AD651	ADC-14I/17I	HDH-0802	SDC1768/RDC1768	276	
AD801	ADC1100	HDH-1003	SHA-2A	277	
AD2004	ADC1105	HDH-1205	SHA-5	285	
AD2006	ADC1111	HDL-3806	SHA-1114	288	
AD2008	ADC1143	HDS-0810E	SHA-1134	310	
AD2009	ADC-QM	HDS-0820	SHA-1144	426	
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AD2036	API1620/1718	IPA1751	2B24	433	
AD2037	BDM 1615/16	IRDC1730	2B34	434	
AD2038	BDM 1617	IRDC1731	2B52	435	
AD2040	CAV-0920	IRDC1732	2B53	436	

Substitution Guide for Product Families No Longer Available

The products listed in the left-hand column are no longer available from Analog Devices. In many cases, comparable functions and performance may be obtained with newer models, but – as a rule – they are not directly interchangeable. The closest recommended Analog Devices equivalent, physically and electrically, is listed in the right-hand column. If no equivalent is listed, or for further information, contact your local sales office.

Model	Closest Recommended Equivalent	Model	Closest Recommended Equivalent	Model	Closest Recommended Equivalent	Model	Closest Recommended Equivalent	Model	Closest Recommended Equivalent
AD362	AD1362	AD7544	None	MDA-LB	None	THC-0300	HTC-0300	232	235
AD376	AD1376	AD7555	None	MDA-LD	None	THC-0750	None	274J	284J
AD501	AD711	AD7560	None	MDA-UB	None	THC-1500	None	279	286J
AD502	AD711	AD7570	None	MDA-UD	None	THS-0025	HTC-0300	280	281
AD505	AD509	AD7583	None	MDA-8H	None	THS-0060	HTC-0300	282J	292A
AD508	AD517	ADC-8S	None	MDA-10H	None	THS-0225	None	283J	292A
AD511	AD711	ADC1102	None	MDA-10Z	None	TSDC1608-161	TSL1612	301 (Module)	52
AD512	AD711	ADC1103	None	MDA-11MF	AD7541A	2N3954	None	302	310 (Module)
AD513	AD711	ADC1109	None	MDH-0870	None	2N5900	None	311	AD549
AD514	AD711	ADC1121	AD7550	MDH-1001	None	41	AD515A	350	None
AD516	AD711	ADC1133	None	MDH-1202	None	43	AD549	424	435/AD534
AD520	AD524	AD DAC100	AD561	MDMS-0801	AD9768	47	48	426	AD534
AD523	AD549	ADG200	None	MDMS-1001	HDM-1210	101 (Module)	45	427	None
AD559	AD557	ADLH0032G/CG	None	MDMS-1101	HDM-1210	102	48	454	AD537
AD612	AD524	ADLH0033G/CG	None	MDS-0815	None	106	118	456	AD537
AD614	AD524	ADM501	ADM501/506	MDS-0815E	None	107	118	602J10	AD524
AD810-813	None	ADP501	ADP511	MDS-0830	HDS-0820	108	52	602J100	AD524
AD814-816	None	ADSHM-5	HTC-0300	MDS-0850	HDS-0820	110	48	602K100	AD524
AD818	None	CAV-1020	MOD-1020	MDS-1020	None	111	AD308	603	AD524
AD820-822	None	CAV-1202	None	MDS-1020E	None	114	None	605	AD524
AD830-833	None	DAC-100F	None	MDS-1040	HDS-1025	115	None	752	759
AD835-839	None	DAC-10H	DAC-10Z	MDS-1080	HDS-1025	120	50	901	904
AD1408	None	DAC1106	None	MDS-1240	None	141	40	907	921
AD1508	None	DAC1112	DAC12QS	MDSL-0802	HDS-0820	142	48	908	921
AD2003	AD2021	DAC1118	None	MDSL-0825	None	143	52	909	921
AD2022	None	DAC1122	AD7541	MDSL-1002	HDS-1025	146	AD382	931	None
AD2023	None	DAC1125	AD7533	MDSL-1035	None	149	50	932	None
AD2024	None	DAC14QM	DAC1136	MDSL-1201	HDS-1250	153	AD517	933	None
AD2025	None	DAC16QM	DAC1136	MDSL-1250	None	161	None	935	None
AD2027	None	HDL-3805	HDL-3806	RTI-1200	RTI-711 Series	163	None	942	None
AD2028	None	HTC-0500	HTC-0300	RTI-1201	RTI-711 Series	165	None	944	None
AD5010/6020	AD9000	IDC1703	IRDC1730/1731	RTI-1202	RTI-711	170	171	946	None
AD7115	AD7111	MAH-0801	HAS-0802	SERDEX	μMAC-5000	180	AD OP-07	948	947
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*New product since publication of the most recent Databooks.

†C = Data Conversion Products Databook, D = DSP Products Databook, L = Linear Products Databook, SF = 1990 Short Form Designers' Guide,

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